RAILROAD GAZETTE

FRIDAY, MAY 17, 1895.

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Contributions.

The Standard Code on the M., K. & T.

PHILADELPHIA, May 13, 1895

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have just read your account of the adoption of the standard code of train rules by the Missouri, Kansas & Texas. It is gratifying to see that this feature of railroad operation is still a subject of careful thought. There have been those who feared that the laborious nature of the work connected with discussing or revising these rules might lead some to drop the matter from pure weariness, allowing their rules to stand from mere inertia, as they used to ten years ago; while, on the other hand, some of the best friends of the standard code have been afraid that the refinements of criticism and alteration which recently have seemed to prevail in the committee of the American Railway Association might tend to destructive results. The action of the M., K. & T. at this time is particularly welcome. The Association Committee has decided to leave out a lot of rules and to injuriously modify others; but, if I may judge from what is published in your article of May 10, the M., K. & T. acted before the committee's deliverance had been made public. I do not think this will do any harm. While it may be all right for the Association, as an association, to expunge from the rules every bit of color, as far as possible, it will yet remain true that the management which issues rules to its employees will not desire to remain silent on these omitted points; and, if you are going to issue rules on those subjects at all, what better phraseology can be found than that which has been in such successful use for the last eight years on the Wabash, the Richmond & Danville, the Pennsylvania and the other roads which early adopted the standard code?

Some of the rules introduced by the M. K. & T. are particularly good. Rules 20, 89A, 94A, 95A, 99B and 119A ought to be adopted on every road. It is true that most of the things required by these rules are already embodied in *some* rule on every good road, but what I wish to emphasize is the propriety of putting these into that part of the code which is, or ought to be, uniform on all roads. Numbers 89A and 99B are not of great importance where the block system is in use, but for roads which do not use it, 99B embodies an important principle which is very generally neglected. Everyone recognizes the necessity of modifying the strict requirements of rule 99, but nearly everyone, in trying to make the modification, commits a blunder at some point. In this case the modification has been made in a very clear and simple manner.

Rule 516A requiring conductors to read train orders to brakemen, etc., deserves a word of mention; not because the M. K. & T. has done anything novel, but rather for the opposite reason: to note the fact that the number of roads now imposing this requirement upon conductors and enginemen is large and increasing.

But there is one rule which, I think, deserves to be criticized. It is No. 524C, which requires a conductor to sign a train order before it has been repeated. Perhaps I am not up to date in the lively methods of the enterprising West, but I have always been taught to regard the regulations of the standard code for handling "31" and "19" orders as about perfect, being simple and safe. What is the reason for this modification of the rule?

While I am on the subject of rules let me ask a question about the train air signal. From the statement in your article, I conclude that the M., K. & T. rules for this apparatus are entirely distinct from those for the management of the air-brakes, but it seems to me that they ought to be combined. In making up trains the same man attends to both and the connections of both ought to be tested at the same time. The brakeman or inspector at the rear of the train must communicate with the engineman as to the condition of the brakes, and he ought at the same time to advise him as to the condition of the air signal. Further, why should he not make this communication by means of the air signal? An instance lately occurred of an engineman starting a train before the air signal hose had been fully coupled up, a false signal having been given by the whistle in the cab while the inspector was coupling the hose, and the inspector was injured. If there had been a regulation requiring the engineman to assume that neither the brakes nor the air signal connections were in order until he received a certain number of distinct blasts on the whistle, this accident would not have occurred.

T. M.

Specifications for Interlocking Work.

32 PARK PLACE, NEW YORK, April 30, 1895.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In the effort to decide upon a universal system of night signals for semaphores, other questions of equal importance seem to have been set aside. My purpose in offering the attached list of specifications is to draw attention to this fact, and, if possible, arouse enough interest in the minds of those high in authority on our railroads so that finally by combined action some such result may be reached for interlocking standards as has been so happily accomplished by the Master Car Builders with regard to rolling stock.

It is also believed that there are plenty of gentlemen engaged in the operating departments of railroads who are well informed and sufficiently interested in the matter to give their time and attention to it.

Good manual interlocking practice, its limitations and the necessities of its design are now so well understood that it is perfectly possible to frame a permanent set of rules which shall be broad enough to apply to all railroads and still be quite specific in its terms. The great number of parts for the same purpose that now exists is entirely owing to a want of system, is expensive, and, as the number of firms engaged in the manufacture of signaling material increases, the conditions will undoubtedly grow worse unless some such plan as is suggested shall be adopted.

Quite the larger number of railroad companies, when they ask for proposals on an interlocking plant, now furnish nothing in the way of information but a plan of the tracks, leaving it entirely to the contractors to say what shall be supplied, and since the award depends upon the lowness of the bid, the party most interested in the result, that is the railroad company, puts a premium on bad work.

The quality of material, the dimensions of jaws, cranks, wheels, pipe, chain and many other questions of a like character may now be definitely decided upon, and whereas it would be of vast benefit to the railroad companies, I believe that the manufacturers also would hail it with gratitude, for it would remove from their business an element of uncertainty which has always been embarrassing and sometimes ruinous.

The adoption of some such specifications would also protect those railroad companies who from one cause or another are unable to employ a competent signal engineer, against the dangers due to the unwise advice and solicitation of persons whose only real claim to attention is that they have something to sell. Last, but not least, a higher, safer standard would be established which would forever banish many dangers not generally recognized.

These rules took their rise at first from the original set prepared by the Pennsylvania lines west of Pittsburgh. Since then they have been amended and added to as experience and consideration dictated: although they cannot be called complete, for they are confessedly wanting in many things. It is hoped that they will serve for a beginning.

GEO. H. PAINE.

DESCRIPTION OF SIGNALS.

All signals shall point to the right when viewed from approaching trains, which they govern; they shall be of the Semaphore form, and consist of the three styles known as Home, Distant and Dwarf.

A Home Signal shall be a blade about 5 ft. long, with a square end, painted red (?) on the face (that is, the side toward approaching trains, which it governs), white on the back, and placed not less than 25 ft. above the rail. When in a horizontal position, or showing a red (?) light at night, the signal shall indicate *danger—stop;* when inclined at an angle of not less than 66°, nor more than 75°, or showing a white (?) light at night, the signal shall indicate *all clear—go ahead.*

The Home Signal shall be used only in connection with movements on the main track in the direction of the traffic, or from the main track to facing point diverging tracks, or facing point cross-overs.

The Distant Signal shall be a blade about 5 ft. long with a notched end, painted green (?) on the face, white on the back and placed not less than 25 ft. above the rail. When in a horizontal position, or showing a green (?) light at night, the signal shall indicate *caution;* in other words the train must be prepared to stop before reaching the next Home Signal; when inclined at an angle of not less than 60° nor more than 75° or showing a white (?) light at night the signal shall indicate that the track is *clear* throughout the territory of that interlocking plant. A Distant Signal shall be used always in connection with a Home Signal, never by itself (see the rule regarding the use of Distant Switch Signals) and no Distant Signal shall work in connection with more than one Home Signal on the same post. It shall indicate, when in its *cautionary* position, the *probable* position of the Home Signal and when *clear*, the *actual* position of the Home Signal.

The Dwarf Signal shall be a blade about 1ft. long, with a square end, placed not more than 4 ft. above the base of its support; it shall be painted red (?) on the face and white on the back. When in a horizontal position or showing a red (?) light at night it shall indicate *danger, stop;* when inclined at an angle of not less than 60 deg. nor more than 75 deg., or showing a white (?) light at night it shall indicate *all clear, go ahead.*

The Dwarf Signal shall be used only for movements against traffic on the main tracks and for movements on side tracks.

Distant Switch Signals shall present the same appearance as do ordinary Distant Signals, but they shall be used at outlying main-track switches for the purpose of warning approaching trains as to the position in which the switches will be found. In this arrangement it is assumed that the Switch Target represents the home signal.

The arrangement of Signals upon the same upright shall be as follows: The topmost Home Signal shall control the most important route in all cases. Where two Home Signals exist the lower shall control all routes except the one controlled by the topmost signal; where there are three Home Signals, the middle one shall control some single route only less important than the route controlled by the upper signal, while the lower Home Signal shall control all other routes.

If on the same upright, Distant Signals shall always be placed beneath Home Signals; and when two Distant Signals occur on the same upright, the upper one shall work in connection with the upper Home Signal, the lower one in connection with the lower Home signal of those to which they relate.

Not more than one Dwarf Signal shall be placed upon the same upright, the clearing of which shall control all routes immediately beyond it.

The Location of Posts shall be as follows: Home Signal posts shall be placed, wherever possible, not less than 50 ft., nor more than 300 ft., in advance of the points which they govern. Distant Signals and Distant Switch Signals on a level track shall be placed not less than 1,500 ft. in advance of the Home Signals with which they are connected; should the grade fall or rise this amount must be proportionally increased or decreased 10 ft. for each change in grade of 1 ft. per mile. Dwarf Signal posts shall be placed, wherever possible, not less than 50 ft., nor more than 200 ft. in advance of the points which they govern. No signal shall ever be placed in such a way as to be overlapped by the Territory which it is intended to control. Straight Posts (as distinguished from Bracket Posts) shall be placed immediately beside, preferably to the right, or when on a bridge, directly above the right hand rails of the tracks to which they relate. Signal Posts should be located to the end of securing the best possible view for approaching trains; it is advisable also to keep them in view of the Cabin, having due regard to other considerations.

Bracket Posts shall be used in all cases where it is intended to signal trains on parallel or converging main tracks from the same post or where a track intervenes between a post and the track that is to be signaled. The uprights shall be placed 7 ft. 6 in. from center to center and their relative positions shall correspond to the relative positions of the tracks.

Back Lights of blue (?) glass shall be used on all signals not facing the cabin, excepting Distant Switch Signals.

[TO BE CONTINUED.]

The Standard Code on the New York Central.

The rules for the operating department of the New York Central & Hudson River Railroad have been revised and put into a shape conforming to the standard code, and General Superintendent Van Etten has issued the new books, to go into effect next week when the spring time-table is adopted. The work of revising these rules has been going on for a considerable time. The officers of the company seem to have been waiting to secure the benefit of any additional improvements which might be made by the American Railway Association; but evidently they have concluded that it will not be worth while to wait longer.

The variations from the standard code are not numerous. A number of general rules, which are usually found in other parts of rule books, are here inserted in the first chapter (general rules). For instance, rule 8*b* reads:

"Employees are required to exercise great care to avoid injury to themselves and others, and are required to inform themselves respecting the location of all structures or obstructions along the line that will not clear them when on the top or sides of cars; also as to the conditions of equipment and track. They are also required to know that all brake wheels, dogs, grab irons, hand holds, steps and other appliances used in the line of their duty are secure and in safe condition before using same."

This is the only rule we find on this subject, except that in the rules for brakemen their attention is particularly called to this rule (and to rule 9*c*, which requires the use of sticks in coupling cars).

Rule 9*a* forbids the use of intoxicating drink; 9*b* forbids smoking, etc. Rule 20 is in the simplest form, leaving all irregularities and doubts to be settled by the train dispatcher. The wording is "· · · trains unless otherwise ordered shall be run as scheduled thereon." Among the abbreviations for use on employees' time tables are: A, arriving time; L, leaving time; asterisk (*), meet or pass trains at reduced speed.

Rule 34 requires trains on the passenger tracks (where there are four main tracks) to display a red and a green light at night at the rear. The diagram for this shows the two lights side by side, close together, at the center of the platform of the car. These are in addition to the markers at the upper corners of the car. The diagram showing "rear of train by night while running" (except on certain tracks as just noted) shows a single red light on the platform in the center, in addition to the usual two markers. This takes the place of diagram No. 2 in the standard code.

On the Hudson Division, where there are not four main tracks, but where there are some pieces of middle

track used by freight trains, the practice seems to be reversed, for here the green light is to be used on the freight track instead of the passenger.

Rule 45 is divided into two. Four long blasts calls in a man from the west or *north* and the other signal from the east or south, but neither one of these signals is used on the four-track line. On that portion of the road flagmen are never called in by whis le signals.

Rule 56*a* prescribes five blasts of the air whistle for the conductor to call for more steam heat. Rule 64*a* tells us that block signals are the subject of special instructions in another book. Rule 85 is in the standard form, leaving no clearance time at meeting points. This is one of he few features in which the practice of the road is changed by the new code. The time interval between both passenger and freight trains is five minutes. Rules 93 and 97 are omitted, as recommended by the Association, and the substance of Rule 98 appears as 99*a*. Rules 101 and 102 are omitted, and No. 100 reads:

"All operations of switching trains, cars, or engines, or of crossing from one track to another must be performed only at such time and in such manner as to prevent the chance of accident, and strictly in accordance with the rules. Great caution must be used and good judgment is required to prevent detention to trains, and Rule 99 must be strictly observed."

Rule 103 is in the standard form, but it is not to apply on the Hudson Division. On that division it has long been the practice for the rear portion of broken trains to be pu hed forward b the next train following, a man going 1,500 ft. in advance; and the old practice is retained.

The third paragraph of rule 521 is emphasized by being printed in large, full-faced type. For rule 524 form B is used. On the main lin wher the block system is in use all train orders are sen to block signal stations, where trains are stopped by the regular block semaphores.

Following the forms of train orders is the following list of

TELEGRAPH NUMERALS:

1. Wait a minute.
3. Give me correct time.
4. Where shall I repeat from?
5. Close your key; you are breaking.
7. I have business: are you ready?
8. Busy on other wire.
9. To clear the li e for train orders, and for operators to ask for train orders. On Division wire will have preference over all signals excepting "21."
12. How do you understand?
13. Understan ?
14. What is the weather?
15. Have you any orders?
16. Dispatche, s Freight Report.
17. Daily weather report.
18. What is the matter?
19. Train order—as provided in the rules governing same.
21. Extreme emergency. On Divisi wire this must have preference over al other business. On through wire will have preference over signals "25" and "34."
23. The following is for you and others.
24. Repeat this back.
25. Time reports of passenger trains to General Superintendent (used on through wire). Preference of circuit over ordinary and "34" business.
28. Do you get my writing?
29. This is private and must be deliv ed in sealed envelope.
31. Train order, as pr vided in rules governing same.
34. This message is of great importance.
39. This must have preference over all other busines on through wires, and will be used only by the President, Vice Presidents, General Manager and General Superintendent.
92. This message should b copied in ink.

The word "wire" will be used by the testing operator for wire testing purposes, and will have preference over all signals excepting "9" ("19" and "31" as provided in the rules) and "21" on Division wire.

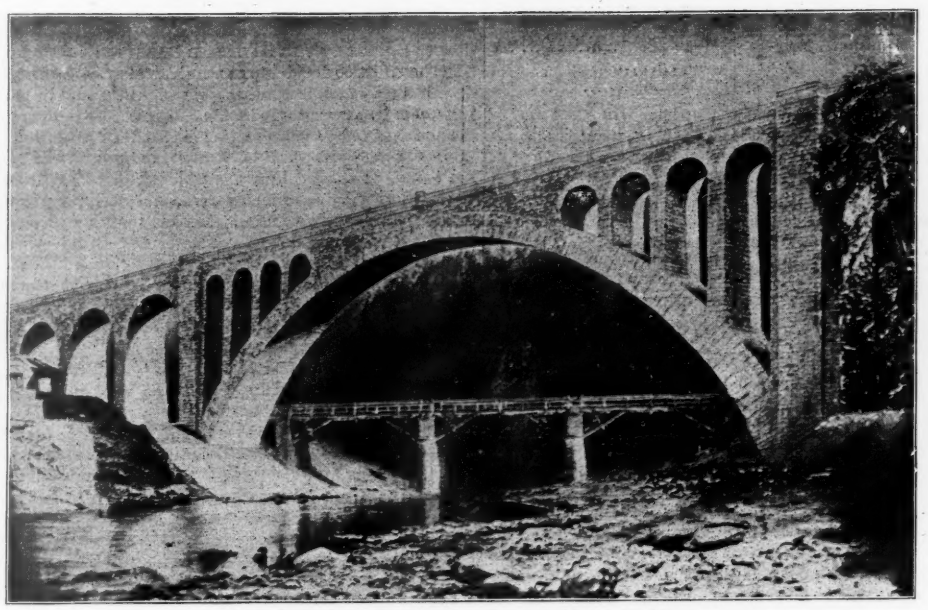
The rules for the different classes of employees fill 24 pages. In general they are similar to the rules, in this department, of the Pennsylvania code, though they are differently arranged, both as regards the chapters and the different subjects in a particular chapter. These rules are not numbered. The principle seems to have been to be very brief, some of the rules being practically not much more than a general injunction to the man to attend faithfully to his duties, using his best judgment, and following the rules of the code so far as they apply to him. This part of the book seems to have been written with great care, and the language is more clear and precise than we often see in such rules. If one is to adopt this plan of extreme brevity these rules are probably susceptible of very little improvement in form, though of course there are numerous opportunities to criticise their substance. For instance, station agents are to open their ticket offices 30 minutes before the departure of a train, a rule which is probably broken a hundred times every day. They are also instructed to notify consignees immediately on arrival of freight, which also is more honored in the breach than in the observance. But there are numerous clauses in these rules which deserve special commendation. Conductors are to tell passengers "the probable location and leaving time of trains to which they will change" at connecting points; trainmen who encounter a passenger-car hog and want a seat for a passenger are to remove the obstructing bundles "in a careful manner, placing them in the rack, or on the floor within easy reach of the owner." Passenger trainmen are to request passengers to show their tickets on entering the cars, where practicable, and send them back for tickets if they have none. When there is a private car on the rear of the train the tail end man will "ordinarily ride in the front end of it or in the next car ahead.

Enginemen must report for duty "at the appointed time" (not 30 minutes or one hour ahead of leaving time, as is the case with less independent employees). Conductors and enginemen are to communicate train orders to their subordinates. Section foremen in foggy weather must suspend ordinary work and detail their men to patrol the track with signals. Telegraph operators, on shutting up for the night, must leave their address in the window where it can be read from the outside.

The Pruth Bridge at Jaremcze.

In our issue of Nov. 24, 1893, appeared a description of some masonry arch bridges to be built over the river Pruth on the line of the Austrian Stanislau-Woronienka Railroad. In what follows, abstracted from the "Journal of the Austrian Societies of Engineers and Architects," some data are given of the construction of the largest of these bridges, that over the Pruth at Jaremcze, which has a span of 213 ft.

The illustration shows the completed bridge. Each of the three rings of arch stones was placed in position dry, and after the completion of each ring the joints, which were nearly ¾ in. as a minimum, were grouted. The



Bridge Over the Pruth, Near Jaremcze—65 Meters Span.

experience in this case has shown this method to be a success. The adhesion of the mortar to the stone is very great, and the close supervision possible during the short period of grouting assures the avoidance of cavities in the joints. 3.25 lbs. of Portland cement and 0.114 cu. ft. of mortar were used for 1 cu. ft. of cut-stone masonry. The dry-setting of the stones of the bottom ring took place at eight points simultaneously, in order to load the falseworks as evenly as possible. The latter settled 3⅛ in. under the load of the bottom ring and 4⅛ in. after the setting of all three rings. The bridge is covered with a layer of concrete 2 to 3½ in. thick, which received a ¾-in. coating of natural asphalt applied hot. After the hardening of the asphalt a layer of coarse gravel was spread as protection against the track material. A test of the arch with three locomotives did not show any deformation.

The Rise and Progress of River and Harbor Improvements in the United States.*

The utilization for commercial purposes of the waterways of our country is so important a factor in our national growth and prosperity that it cannot fail to interest the student of political economy, and when attention is directed to the importance of such water highways it will be admitted that they are not secondary in importance to even our wonderful system of railroads. The navigable waters of the country are the nation's highways and are under the control of the government. The riparian owner may possibly make some claim of ownership to the bed of the waterway by erecting wharves and landings which do not impede the navigation of the waterway, but here his privilege ends and the rights of the public begin.

The individual states cannot exercise control over the waterways. The old English theory that the rivers and bays of the kingdom existed only for the purpose of floating the king's ships and furnishing salmon for the royal table was imported to this country by the early colonists, and hence each state, as a separate sovereign, held that it had supreme control over the navigable waters within its borders, exercising the right of leasing or selling the exclusive privilege of using such waters to individuals or companies. Such rights are still claimed by New Jersey and Deleware regarding fishing privileges. While they are passively recognized by the general government at the present time, they are not permitted to interfere with the improvements of the nation's navigable waters.

Under the "Articles of Confederation," from 1777 to 1789, Congress had no power over commerce or navigation, and the states enacted laws regulating their own commerce. This resulted in a degraded and disorganized condition of affairs, which was solved by the adoption of the national constitution in 1789, which provided that "Congress alone should have power to regulate commerce in the several states."

At the beginning of this century Philadelphia was the seat of the nation's capital, and at that time the first appropriation ever made by Congress for the improvement of waterways provided for the erection of public piers in the Delaware River at a cost of $30,000. Small as was the revenue of the country at that time, the importance of developing the navigable waterways seems to have impressed itself upon Congress. It 1819 it was provided that 5 per cent. of the proceeds derived from the sale of public lands in Alabama should be reserved for the purpose of building public roads, canals and improving the navigation of rivers in that territory. In 1822 the Delaware breakwater was commenced with an appropriation of $22,700, a work which has been continued up to the present time at a cost of $2,728,000. In 1824 surveys and estimates of roads, canals and rivers were authorized, and the Chesapeake & Delaware Canal was begun. The first river and harbor bill was passed during the administration of John Quincy Adams, and aggregated $150,000, applicable to 20 localities. As a comparison, that of 1892 aggregated about $22,000,000, and was applied to 425 localities. exclusive of surveys, etc., at 145 localities.

From 1826 to 1838 Congress continued to make annual appropriations for the improvement of a large number of rivers and harbors, expending during that interval about $9,000,000. At the end of this period a change of public policy, extending to 1866, took place, and only three regular river and harbor bills were passed during that time. In 1841, however, it was provided that for each new state thereafter entering the Union 500,000 acres of public land should be set aside, the proceeds from the sale of which should be applied by the state to the building of bridges and the improvement of roads, canals and water courses. The only provision was that the United States should have the right to transport mails, troops and munitions of war over such canals, roads, etc., free of toll. The interval of 26 years above mentioned, during which so little was done in the improvement of national highways, extended to the close of the civil war. From this time a new departure in river and harbor improvements took place, and a policy was originated which has steadily expanded ever since. During the last 29 years, 94 per cent. of all the money spent for river and harbor improvements has been appropriated. The total amount appropriated from 1820 is $262,845,900.

The legislation most interesting and best illustrating the position which the Government has assumed regarding its waterways, is that relating to its broad denial of the right of any individual, corporation, municipality, etc., to in any manner interfere with the free and safe navigation of any navigable waters of the United States without authority from the Government. The Secretary of War has authority to establish harbor lines wherever he may consider it desirable, beyond which no piers or wharves or other constructions may be built except as he may prescribe. No bridge can be built across any navigable water course without the approval of the Secretary of War and under his supervision as regards details. Any wrecked or sunken vessel which for the period of 60 days has been permitted by its owners to obstruct or endanger navigation may be destroyed and removed by the Government without payment of any claim for damages to the owners arising from the destruction of such vessel or cargo. The works of improvement are carefully guarded, and by acts of Congress it is made unlawful for any person to build on or in any manner impair the usefulness of any seawall, bulkhead or other construction of this nature. In the improvement of any navigable waters the Government may close subsidiary channels or divert such channels to new positions without being subject to claim for injury by the riparian owners.

To show the nature of the work which has been accomplished in recent years, it is interesting to note that the Great Eastern, which in 1858 with a draught of 25 ft. could enter but one harbor in the United States, that at Portland, Me., had a draught 2 ft. less than that of the St. Louis, recently launched from the Cramp's shipyards on the Delaware, which will be able to enter all of our larger ports.

* From a lecture delivered before the Franklin Institute, Dec. 21, 1894, by I. Y. Schermerhorn, C. E.

A New Schenectady Locomotive.

The locomotives illustrated by the engraving from a photograph, were designed and built for the Delaware & Hudson Canal Co., by the Schenectady Locomotive Works. They show in a number of points marked improvement in design of the American type of locomotive for heavy, fast service.

As it will be seen from the specifications, the engine, being designed for anthracite coal, has a long firebox, but unlike the usual practice for this type of firebox, the boiler does not extend through the cab, but is so arranged that a foot plate is used, giving more convenient accomodations for engineer and fireman.

In designing the engine the aim of the builders was to give the largest amount of grate and heating surface with the least weight; to effect which very light forms of piston, crosshead, connecting rods and driving wheel centers were used. The weights of the reiprocating and revolving parts are as follows:

Piston, with 3½-in. rod	301 lbs.
Crosshead	156 "
Main rod	432 "
Side rod	241 "
Main crank pin	110 "
Back crank pin	104 "

The driving wheel centers are of cast steel and each weighs about 600 lbs. less than the ordinary cast iron center of the same dimensions. The reduced weight in revolving and reciprocating parts and corresponding reduction of weight in counterbalance, together with light wheel centers, driving boxes, etc., make a very easy engine on the track, in fact no harder than the ordinary eight-wheel locomotive, having 9,000 lbs. less weight, or 75,000 lbs. on drivers.

As will be seen in the engraving, the boiler is sloped down from the dome and narrowed in at the sides toward the back, reducing to a minimum the overhanging weight. The foot plate is of cast steel and very light. The driving boxes, eccentrics and straps are of gun iron, while a large number of the other heavy castings are of steeled iron, reduced in section to the minimum weight. The boiler is of the extended, wagon-top type, but instead of having radial stays, has crown bar staying for the crown sheet, this being specified by the road. The smokebox front and door, cylinder head casings, smokestack base and dome casing are of flanged steel. The engine is one of a lot of three built by the Schenectady Works for the D. & H. C. Co., for use on the heavy fast Saratoga and Montreal summer trains.

SPECIFICATIONS OF EIGHT-WHEEL PASSENGER LOCOMOTIVE BY THE SCHENECTADY LOCOMOTIVE WORKS FOR THE DELAWARE & HUDSON.

General Dimensions.

Fuel	Anthracite coal
Gage of road	4 ft. 8½ in.
Weight in working order	123,500 lbs.
" on drivers	84,000 lbs.
Wheel base, driving	8 ft. 6 in.
" " rigid	8 ft. 6 in.
" " total	23 ft. 1 in.

Cylinders and Valves.

Diameter of cylinders	18 in.
Stroke of piston	24 in.
Horizontal thickness of piston	4¾ in. at rim; 5¾ in. at hub
Kind of piston packing	Cast iron rings
" " piston rod	Jerome Metallic
Diameter of piston rod	3½ in.

Wheels, etc.

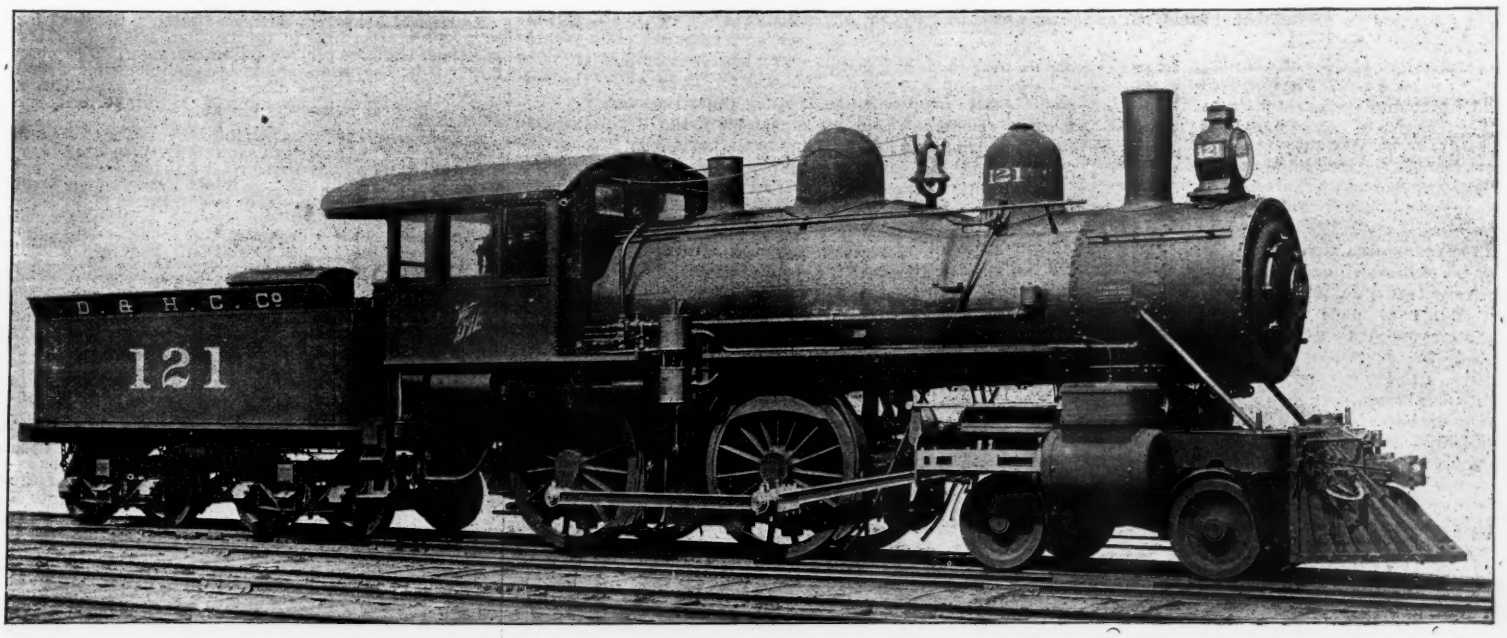
Diameter of driving wheels, outside of tire	68½ in.
Material of driving wheels, centers	Cast steel
Tire held by	Shrinkage
Dia. and length of driving journals	8 in. dia. × by 11 in. long
Dia. of engine truck wheels	33 in.
Dia. and length of main crank pin journal	5½ in. × 5½ in.
" " " " side rod " " "	4½ × 3½ in.
Driving box material	Gun iron
Engine truck wheels	Boies steel tired, solid center
Driving springs	Hung underneath the driving boxes
" " centers	42 in.

Boiler.

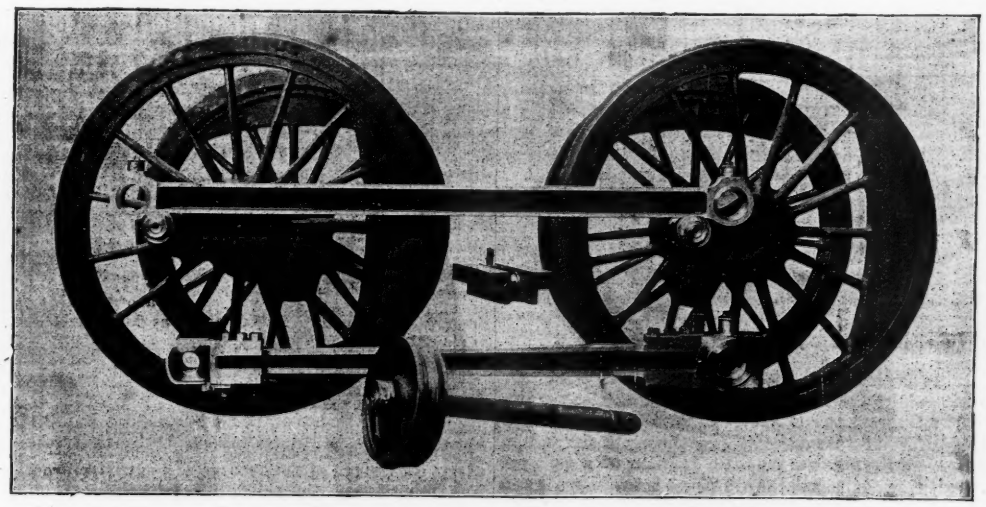
Style	Extended wagon top
Outside diam. of first ring	60 in.
Working pressure	180 lbs. per sq. in.
Material of barrel and outside of firebox	Otis steel.
Thickness of plates in barrel and outside of firebox,	5/16-in., 5/8-in., 7/16-in. and ½ in.
Horizontal seams,	Sextuple riveted, with welt strip inside and outside
Circumferential seams	Double riveted
Firebox, length	132⅜-in.
" " width	40⅜ in.
" " depth	68½ in. front; 65⅛ in. back
" " material	Otis steel
" " thickness,	Crown, ⅜ in.; tube, 5/8 in.; sides and back 5/16 in.
" " water space	Front, 4 in.; sides and back, 3½ in.
" " crown-staying	Crown bars, 5 in. wide; ¾ in. thick
" " staybolts	U. S. iron, ½ in. and 1 in. diam.
Tubes, material	Charcoal iron, No. 12 W. G.
" number of	288
" diameter	2 in.
" length over tube sheets	11 ft. 2 in.
Heating surface, tubes	1,671.2 sq. ft.
" " water tubes	71.2 " "
" " firebox	187.7 " "
" " total	1,930.1 " "
Grate "	37.2 " "
" style	Water tubes and pull-out bars
Ashpan, style	Hopper, with open ends
Exhaust pipes	Double, high
" nozzles	2⅞ in., 3 in., 3½ in. diam.
Throttle	Balanced valve, single
Smokestack, I. D.	18 in. at top; 16 in. near bottom
" " top above rail	14 ft. 1¼ in.
Boiler supplied by two Nathan injectors,	1 No. 10, R. S.; 1 No. 9, L. S.

Tender.

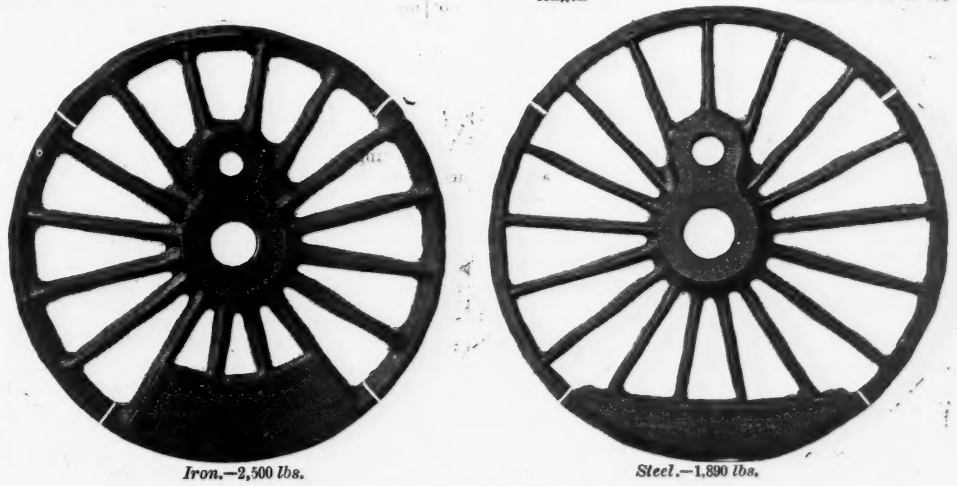
Weight, empty	39,500 lbs.
Wheels, number of	8
" diameter	36 in.
Journals, diameter and length	4½ in. diam. × 8 in. long
Wheel base	15 ft. 10 in.
Tender frame	6½ in. × 4 in. × ¾ in. angle iron
" trucks	Channel iron center-bearing
Water capacity	4,000 gals.
Coal "	8 tons
Total wheel base of engine and tender	49 ft. 4¼ in.
" length " " " "	58 ft. 10⅜ in.



Schenectady Locomotive for the Delaware & Hudson Canal Company.



Certain Lightened Parts—Schenectady Locomotive.



Iron.—2,500 *lbs.* *Steel.*—1,890 *lbs.*

66 in. Driving Wheel Center—Schenectady Locomotive Works.

Size of steam ports	18 in. long × 1⅝ in. wide
" " exhaust ports	18 in. long × 3 in. wide
" " bridges	1⅜ in.
Greatest travel of slide valves	5½ in.
Outside lap of slide valves	⅞ in.
Inside lap of slide valves	0 in. line and line
Lead of valves in full stroke	3/16 in. forward motion; ¼ in. lap, back motion
Kind of slide valves	Allen-Richardson balanced
" " " stem packing	Jerome Metallic

Engine fitted with American outside equalized brake on all drivers, operated by air. Westinghouse automatic air brake on tender and for train; 9½-in. air-pump; engineer's air signal; consolidated steam heating apparatus; Trojan coupler on front of engine and rear of tender; Leach sand feeding apparatus on sandbox; Cory's patent force-feed lubricator for oiling all bearings.

A Solid End Connecting Rod.

Mr. Bruno V. Nordberg, of the Nordberg Manufacturing Company, Milwaukee, Wis., has designed and patented a solid end connecting rod which embodies many admirable features. This rod is used in all the engines made by the company, and also to some extent by Frazier & Chalmers, of Chicago. Although its use up to the present has been confined to stationary engines, yet there seems to be no reason why it could not be advantageously adopted for locomotives.

Figs. 1 and 2 are sections of the finished rod and Fig. 3 is an outside view. The rods are solid forgings and the ends are cut out for the reception of the boxes in a manner shown by Fig. 4. A series of holes is drilled as closely together as possible and the interior piece knocked out by a hammer. Then the circular holes are bored out to the proper size and the straight lines connecting them planed or milled off. A hole is then drilled for the key in the crank end. The boxes shown in Figs. 1 and 2 are different from the usual form. Those for the crank end are of cast steel lined with babbitt, and those for the crosshead end are of phosphor bronze. The one marked B^1 in Fig. 1 is made by casting three together, Fig. 5, after which they are put on a mandrel and finished in a milling machine before being cut apart. In large engines they are of cast-iron faced with phosphor bronze. As shown in Fig. 2, a collar is screwed on to the boxes to prevent them from getting shaky after prolonged service. On small engines, however, this is not done, which simplifies the construction very much.

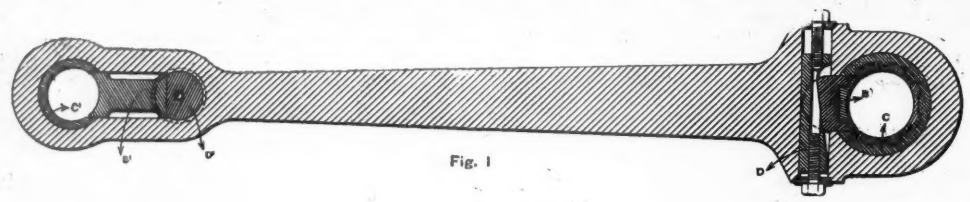


Fig. 1

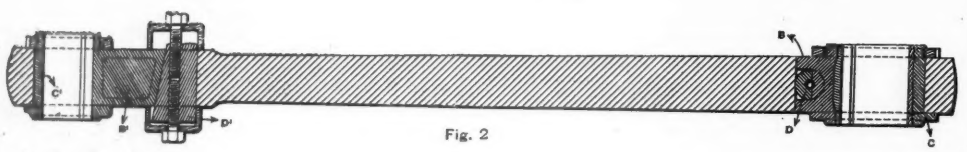


Fig. 2

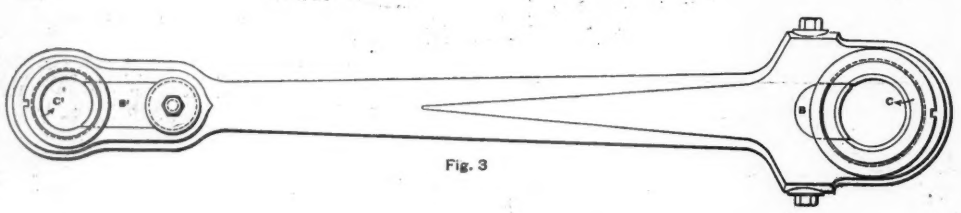


Fig. 3

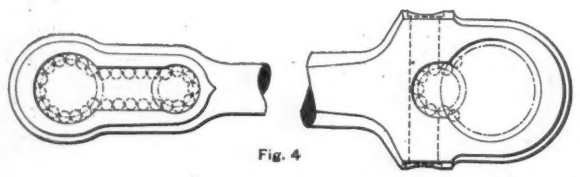


Fig. 4

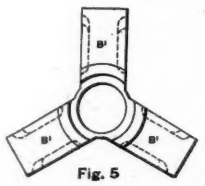


Fig. 5

Nordberg's Solid End Connecting Rod.

Should guides be used of such a character as to permit the use of a vertical key on the crosshead end, both ends of the rod could be made alike instead of as shown in the engravings. Round keys are used, made of cold rolled iron, though in large engines D^1 is cast-iron. They are milled to a taper of 1 in 6. The rod is finished, and the boxes put in position before the final boring for the crosshead and crank pins is done.

There are several advantages gained by this construction. There is a great saving in labor and the work is of such a nature that cheaper labor can be employed since there is no very careful fitting to be done. By the use of round keys rapidity and cheapness in manufacture are secured. The setting by means of the bolts shown in Fig. 1 admits of delicate adjustment, and the box *B*, Figs. 1 and 2, held by a round key, will adjust itself to the crank pin without careful fitting. The design of the boxes is such that pinching is prevented. Should the bearing get heated, the box *B*, fitting within *C*, keeps it from closing on the pin. It is not necessary to remove the boxes and dress off the faces when worn, as is ordinarily done, since their shape is such that all wear can be taken up by the key.

Railroad Legislation in California.

The Legislature of California, which recently adjourned, passed only two acts affecting railroads generally. Chapter 10, amending section 502 of the Civil Code, regulates the time to be allowed for beginning and completing work on new railroads. The municipal body granting the right of way must require work to be begun within one year, and to be completed within three years; but there is a provision for an extension of time, for not more than one year. A failure to comply with the regulations works a forfeiture of the right of way.

Chapter 197 adds a new section (492) to the Civil Code. It authorizes municipalities to grant franchises for elevated or underground railroads, over, across or under streets. No such franchise may exceed 50 years, and in the case of an elevated road it can be granted only on petition of the owners of a majority of the abutting property.

Chapter 89 is a law authorizing the State Harbor Commissioners to condemn certain property for passenger facilities at the foot of Market street, San Francisco.

Chapter 171 gives the State Harbor Commissioners authority over certain lands, as described in certain laws of 1880, 1888 and 1889, and among other things empowers the board to lease 50 acres for 50 years at $1,000 a year to any railroad company which has not terminal facilities at San Francisco. This was for the benefit of the new San Francisco & San Joaquin Valley Railroad.

Chapter 170 amends Section 731 of the Penal Code, to cure certain defects found in the law at the time of the strike last summer. It protects any commanding officer of the national guard from civil or criminal liability when attacking or firing upon mobs in his honest and reasonable judgment; but he shall not, under any pretense, fire blank cartridges upon any mob. Another section prohibits the parade of any body of men with arms without the license of the Governor.

Principles of Railroad Economy in 1850.

Nothing endures like a principle, and this is one reason why it is such a comfort for a man to have a body of fixed principles on which to base the conduct of his life. So it is interesting as well as instructive to find how the principles which are held to be sound in railroad management to-day were formulated in the early days of railroads; and while they are sometimes forgotten they always exist, and the oftener we get back to them the better for us. Doubtless a great many of our readers who are worrying over the little fraction of a cent per ton-mile, which makes the difference between profit and loss in their vast business, will be surprised to know how sound and comprehensive were the teachings of some of the earliest students of railroading. The following passages are from Dr. Lardner's work on "Railway Economy," which was published in 1850, and occur at the end of an able chapter discussing the expenses of railroads. They might have been written yesterday.

From all that has been explained in the present and preceding chapters, it may be inferred that, among the principal measures tending toward an increased economy of expenses in the working of railways, the following are the most prominent:

1. So to manage the traffic that the various classes of vehicles of transport should carry more complete loads, because the share of expenses falling on each unit of load diminishes very nearly in the same ratio as the load of such vehicles increases.

2. So to manage the traffic as to encourage transport to increased distances, because those expenses which are independent of distance will thereby be spread over a greater mileage; that part of the cost per mile of each object of transport diminishing in the same ratio as the distance transported increases.

3. So to manage the traffic, that the number of vehicles drawn by each engine shall be increased, because the cost of traction will thus be divided among a greater number of vehicles. This cost is but slightly increased by the increase of the number of vehicles drawn by each engine, while the expenses falling on each vehicle are diminished in a much larger proportion.

4. So to manage the business of transport, that the distance run by each engine lighted shall be increased, because in this case, those charges on the engine power, which are independent of distance, are divided among a greater extent of mileage; and the share of those charges falling on each vehicle drawn will be diminished *cæteris paribus* in the same proportion as the engine mileage is increased.

5. In cases where the traffic prevails chiefly in one direction, and, consequently, where empties are drawn in great quantities in the other direction, to study the local productions and modify the tariff so as to attract loads for the empty vehicles at a tariff which may be productive under such circumstances, though unproductive under ordinary conditions. By these means, the average load of the vehicles of transport will be augmented.

6. Not to multiply the trains to beyond that point which the reasonable accommodation of the public renders indispensable. The more the trains are multiplied the less complete will be the loads of every description of traffic, and the greater will be the share of expenses which will fall on each unit carried.

7. To sort the loads of each description of traffic as far as possible, according to its destination; and for the passenger traffic to provide mixed carriages, which may take up in the same vehicle the complements of load composed of different classes. By this expedient, a single carriage in a passenger train may perform the office of three.

8. To diminish as far as possible the number of express trains, if it be not practicable to abolish them altogether. Express trains are a source of vast expense, directly and indirectly, which can never be repaid by any sort of tariff to be laid upon them. They are a source of expense directly by their extreme speed, which produces a rapid deterioration of the rails, and shakes to pieces the engine and the vehicles of transportation. They are a still greater source of expense indirectly, by the effect they produce on the ordinary traffic of the line. Regular trains are either urged forward at undue speed to get out of their way, and thereby the wear of the line, the engines and the carrying stock, are increased, or they are compelled, as in the case of good trains, to stop in sidings to let the express pass. By multiplying the stoppages of heavy goods trains the wear of the rails, engines and vehicles of transport themselves is seriously increased by the effects of the absorption of the momentum of so great a mass in stopping, and the action of the engines in producing the momentum in starting; both of which, by the common laws of motion, must be expended on the rails, the axles, and other parts of the mechanism upon which the train is thrown.

The Efficiency of Compound Locomotives.

On Wednesday of last week one of the engineering evenings of the American Society of Mechanical Engineers was held at the house of the Society in New York City. The president of the Society, Mr. E. F. C. Davis, General Manager of the Richmond Locomotive & Machine Works, was in the chair. The subject for consideration was the compound locomotive and it was introduced by Mr. F. W. Dean, M. Am. Soc. M. E., with a paper which follows in full.

The compounding of locomotives presents to the railroad companies of this country the greatest means of fuel economy that has been placed within their reach, and it it fair to assume that this is the greatest of all the economies that can be carried out by railroads. Long since used in engines for all other purposes with marked success, the compound principle in using steam was unused in locomotives until recently, especially in this country. Of late, however, the country has been somewhat flooded with compounds, some of very inferior designs. The result of this has undoubtedly been to cause a reaction, several compounds have been changed to simple engines, and many railroad men are either in a skeptical state of mind or condemn such locomotives in an unqualified manner. Wherever this condition exists, it can always be traced to an experience with locomotives having such bad qualities that their use was simply intolerable.

Fortunately, there are a sufficient number that are proving to be unobjectionable, and are so highly advantageous in many ways that their continued use is assured and will be gradually extended. There is nothing in which the expression "survival of the fittest" will apply with more pertinence than to compound locomotives. Persons either possessing such exceptions or being intimately acquainted with them never hesitate to say that they are the locomotives of the future, especially for freight, elevated railroad and suburban work. A type of engine that can clearly save fully one-quarter of the coal now used by simple locomotives, that materially reduces water consumption, diminishes boiler and slide valve repairs, reduces smoke, cinders and the fire risk, that steams better than the simple engine in hard places without a necessary increase of any kind of repairs, must surely become the favorite as soon as people know which design to select.

Your committee has asked me to speak particularly of the *efficiency* of compound locomotives. This I propose to do briefly and as clearly as possible, and I shall begin with a statement of the reasons why a compound locomotive that is properly designed will save steam compared with the best simple locomotive, no matter what kind of service is considered.

1. The steam can be more conveniently used with great expansion, and therefore high steam pressure can be more advantageously utilized.

2. Division of the expansion between two cylinders diminishes condensation in both cylinders by reducing the range of temperature in each cylinder.

3. Division of expansion between two cylinders renders it possible to evaporate, or re-heat, a portion of the moisture in the exhaust of the first cylinder, and thus render it capable of doing work in the second cylinder. As this can be done in the locomotive with waste gases the gain is all profit. By using the proper kind of receiver this is an effective means of economy.

4. Steam that leaks through the value of the first cylinder is, in a properly designed locomotive, worked expansively in the second cylinder.

5. Steam that is re-evaporated toward the end of the high pressure piston stroke, too late to work expansively, instead of being exhausted to the atmosphere as in the simple locomotive, is worked expansively in the low pressure cylinder.

Concerning the first reason, the expansion in the compound locomotive can be secured with a later cut-off than in the simple locomotive, and with this comes a wider port opening and less wire drawing of the steam. It is feasible to expand steam in a single cylinder by cutting off early, but such efforts have always resulted in wastefulness by great condensation, thus giving rise to the familiar expression "expansive working is expensive working." D. K. Clark showed as early as 1850 that a cut-off of about one-third stroke in a simple engine is the most economical, and the same thing has been recently shown by Professor Goss in this country. So that if a high degree of expansion is used in the simple locomotive it means extravagance in steam, although it may save some coal by low terminal pressure and gentle exhaust action on the fire. The compound locomotive, however, saves 15 to 20 per cent. of steam, and above this saves coal by its low terminal pressure and gentle pressure.

Concerning range of temperature, in certain typical

cases in my possession, the temperatures and ranges were as follows:

SIMPLE.		COMPOUND.		
Initial temp.....	374°	H. P.	368°	L. P. 312°
Lower.....	230°	"	298°	" 230°
Range.....	144°	"	70°	" 82°

In these cases the simple locomotive used 27¼ lbs. of feed-water per indicated H. P. per hour and the compound 19½ lbs., producing a saving of 29 per cent. This remarkable saving is attributable only to the small ranges of temperature in the cylinders with resultant small condensation, and to the re-heating receiver, for the total expansion was the same in both cases.

In simple locomotives the condensation in cylinders sometimes amounts to as much as 60 per cent. of the total steam used, and in the case of a simple locomotive with which I have experimented, where the passages were well protected, the condensation was 38 per cent.

The effect of a re-heater is rather difficult to determine in a locomotive, and of course no rise in temperature or superheating would be shown until all of the moisture had been converted into steam. As there is much moisture in exhaust steam it is not likely that it will be all dried out by the receiver of a locomotive. In a pumping engine, however, such difficulty disappears, and in a Leavitt pumping engine at the Boston Water Works, while the pressure in the L. P. steam chest was equal to that of the atmosphere, the temperature instead of being 212 deg. was 306 deg., showing the remarkable superheating of 94 deg. As a compound locomotive receiver is bathed in gases of 550 deg. to 600 deg., while the moist steam within has a temperature of only some 280 deg., it is unnecessary to argue that some re-evaporation takes place. When we remember the great capacity of the metal of a steam cylinder to condense and re-evaporate, we have ample reason for the belief that a receiver having a temperature fully 200 deg. higher than that of any locomotive cylinder, has a much greater capacity for evaporating moisture than a cylinder. It is clear, from these considerations, that a receiver in the smoke-box of a locomotive is of the greatest importance in promoting economy.

In the fourth reason for the economy of a compound locomotive I have stated that the leakage by the high pressure valve should pass into the low pressure cylinder, and there worked expansively. This is necessarily so in the two-cylinder engine, but in some four cylinder locomotives, with a single valve to two of the cylinders, leakage may pass directly from the high pressure cylinder, or even the boiler, to the atmosphere.

While I have pointed out the economical advantages of compounding, I must not ignore the losses to which the compound is subject. These losses have in cases converted compounds into more wasteful engines than simples.

I will take up these losses as they occur.

The first is that due to the imperfections of the link motion which are strongly brought out in the high pressure cylinder. These imperfections are great in simple engines also, notwithstanding the protestations of some of my locomotive friends, but in the H. P. cylinder of the compound, as compression begins on steam of receiver pressure, compression is likely to be excessive, and reduces the area of the indicator diagram seriously, and in early cut-offs at ordinary speeds, even, a loop is frequently formed showing negative work, thus reducing the net work. This is one reason why many compounds at certain points of cut-off do much more work in the low pressure cylinder than in the high. It also furnishes a part of the reason why some compound locomotives are less economical, in relation to the simple engine, in light work than in heavy. In the latter case the point of cut-off is sufficiently late to avoid excessive compression and a loop in the diagram.

The usual remedies for this defect are inside clearance to the slide valve, and large clearance volume in the cylinder. The former causes the exhaust to close later, thus trapping in less steam in the clearance spaces, and the latter gives a larger volume to fill by compressed steam and thus reduces the maximum pressure. There is another remedy that ought to be applied in addition, as follows: The high pressure valve should be set so as to give negative lead in full gear, and to give zero lead when cutting off at about 45 per cent. of the stroke. Slipping the eccentrics back sufficiently to accomplish this, delays the beginning of compression, and therefore its maximum amount.

Another loss, which is often great, is that between the cylinders, causing the combined indicator diagram to have a large gap between the bottom of the high pressure and top of the low pressure cards. This loss is so great in many cases as to amount to some 30 per cent. of the possible work of the steam after high pressure release, and will nullify all gains that may come from compounding. It is probable that less than half a dozen compound locomotives in the country have this loss so small as to make it, when coupled with another phenomenon, virtually nothing. The latter will be noticed presently.

The loss between the cylinders is so insidious, so to speak, and so little comprehended, that it should be dwelt upon sufficiently to make its causes and nature clear. It cannot be done away with, even in slow running pumping engines, for even there some work must be absorbed in transferring the steam from one cylinder to the other. In addition to this cause the various resistances produced by obstructions and abrupt changes in direction of the steam passages are to be noted. The steam in passing out of the first cylinder, through the intercepting valve, where this is used, and through the open port of the low pressure cylinder, is considerably retarded and a great loss of pressure is produced. Engines having piston valves suffer much from this loss because the steam has to pass through gratings which form the ports. Engines that have the intercepting valve on the low pressure side are much subject to this loss, because the steam is rapidly drawn from the receiver by the low-pressure piston through this restricted opening. If this valve is on the high-pressure side the steam passes through it only as rapidly as it escapes from the small cylinder, and this is only some one-half to one-third as rapidly as it is drawn into the large cylinder. This shows the importance of placing the intercepting valve as near the high-pressure cylinder as possible.

The type of engine that can be used at will as a simple engine, is in general considerably subject to this loss, for the changing valve forms tortuous passages and abrupt obstructions when the engine is compounded. In this case, also, the valve should be near the high-pressure side.

I should not omit to notice a loss seldom thought of, viz.: that due to the back pressure on the low pressure piston. This piston always has a larger area than the combined areas of the two pistons of the equivalent simple engine. Unless the back pressure per square inch on the low-pressure piston is less than on the simple pistons, in proportion to the greater piston area, it is evident that the work of the back pressure is greater in the compound than in the simple engine. In general, I think the back pressure will be found to be proportionately less than in the simple engine, but this possible loss should furnish caution against over-cylindering a compound locomotive, especially on the low-pressure side, and particularly for high speeds. This is an argument for obtaining large power by means of large high-pressure cylinders, and indirectly for the cylinder ratio of 2 to 1, or thereabout, for a passenger engine.

Having considered all the losses to which a compound is subject, we are in a position to appreciate the reason why certain compound locomotives are highly economical, when working slowly or even moderately fast, with heavy trains. In these cases, in consequence of late cut-offs, yet with considerable expansion, and somewhat slow movement of the steam, the losses described are small, and bear a small proportion to the total work done. The result is that the compound is enabled to bring out those valuable qualities undiminished, which, in numerous cases, it has proved itself to possess.

Most compound locomotives have a low-pressure port ridiculously small, so small, in fact, that, while simple engines require an extravagant velocity of steam through ports, even as high as 1,500 ft. per second, some compounds have it two or three times as great. In such locomotives the loss between the cylinders is enormous, and the engine becomes useless for high speeds.

The compensation for the loss between the cylinders, to which reference has been made, is the increase in the area of the low-pressure diagram, produced by the fact that compression should occur only up to the initial pressure in that cylinder. The late exhaust closure fills out the heel of the diagram and may add to its area the amount lost between the diagrams. In my experience the loss between the cylinders at 232 revolutions per minute was only eight per cent., while in many compounds at this speed it is fully 30 per cent. The above eight per cent. was exactly made up as just described. In the same case the cards realized 87 per cent. of the theoretical isothermal card, having the same ratio of expansion and back pressure, and this was fully as much as a simple engine realized under the same conditions. Such a result is remarkable for a compound engine even in stationary service.

This discussion has brought out the fact that the compound locomotive is subject to losses to which the simple engine is not, and which may render it unfit for fast work. Such defects can, however, be fully overcome by large and easy passages, and the oft repeated statement that the compound is fit only for freight trains is highly erroneous.

From one point of view compound locomotives can be divided into two classes, viz.: the automatic, that starts by allowing live steam to pass to the large cylinder only until the engine has made a half revolution or thereabout; and non-automatic engines, that can be operated at will as simple locomotives as long as desired.

I have always taken the position that the non-automatic engine does not allow the compound system to fully realize its object, and that any locomotive which does not immediately become a compound after making an initial movement is to some extent a failure.

It is held by the advocates of this type that the automatic engine does not start well, and that it cannot pull a sufficiently heavy train over ruling grades. Neither of these features has come within my experience, although that has been with freight trains on a continuous grade of 96 ft. per mile, 12 miles long, and with heavy fast suburban passenger work with 11 stops in 9 miles. It is no exageration, in fact, to say that the starting of the automatic engine has been uniformly surer than that of the simple engine in this service.

The point here considered is of the greatest importance in suburban or elevated railroad work, for here the compound is particularly economical if it is a compound from the beginning. If it is a simple engine for some little time, the greatest part of its peculiar adaptation to the work which requires frequent starting is lost. This will be referred to again.

From another point of view, compound locomotives are divided into two, three, or four-cylinder engines. Here appears a radical difference in detail, and one that must not be passed over without discussion.

In designing an engine for any kind of work it is fundamental that the smallest cylinders that will properly expand the steam should be used, and that the smallest number of cylinders should be used. By pursuing any other course more cylinder, piston, and piston-rod surface is obtained than is necessary. As cylinder condensation is the greatest of all enemies of economy, by using multiple cylinders we invite our greatest enemy to be always with us. It is at least approximately true that cylinder condensation is proportional to surface, other things being equal, and dealing with common sizes, the cylinder, piston, and piston-rod surfaces of a four-cylinder compound engine will be found to be about 33 per cent. in excess of those of the two-cylinder type. It is evident that the four-cylinder compound is therefore very seriously handicapped, when competing with the two cylinder compound.

No further logic should be necessary to show that the four-cylinder compound cannot be justified from an economical stand-point, and has no reason for existence except as a means of producing a balanced engine.

If a two-cylinder compound requires a larger low-pressure cylinder than can be accommodated, two low-pressure cylinders can be used in its place, cast together, one above the other, and yet with advantage over the four-cylinder-engine.

I now wish to consider the various kinds of railroad service with reference to the economy of the compound locomotive. Assuming that the compound is of the automatic type, the order of economy is as follows, the greatest being first:

Elevated city railroad service.
Suburban " "
Freight " "
Express passenger " "

The economy on the elevated railroad is due to the great amount of starting and acceleration of trains. The simple engine can only do this when working steam at full stroke or late cut-offs, while the compound engine will expand the steam some 2¼ times when starting, and much more soon afterwards. Bearing in mind the great economy of steam gained by the early stages of expansion, the economy of the compound is evident. The following table shows the relative values of a pound weight of steam at different points of cut-off:

Point of cut-off.	Value of 1 lb. in Weight of steam.
Full stroke	1.000
¾ "	1.659
½ "	2.000
⅜ "	2.207
¼ "	2 343
⅛ "	2.435
1/16 "	2,495
1/32 "	2.532
1/64 "	2.552
0 "	2.560

This table shows that when the simple locomotive starts, it is using steam in such a way that one pound in weight does work of a value of 1, while the compound obtains from the same weight of steam work represented by 1.659 at least. In most cases it will be more than this, say 1.768 for 2¼ expansions. The saving in steam is therefore $\frac{1.768-1}{1.768} = 43$ per cent. Soon after the simple locomotive is expanding the steam twice and the compound fully four times. The steam quantities are then 1.659 for the simple and for the compound 2.207. The saving in steam is then $\frac{2.207-1.659}{2.207} = 25$ per cent. The actual savings made by some compounds in elevated service show that these figures are not far from the truth.

In express passenger service the quantities would be somewhat thus:

$$\frac{2.435-2.207}{2.435} = 9 \text{ per cent}$$

The remainder of the saving in steam would come from the other causes mentioned in this paper, but chiefly from reduced cylinder condensation.

If we add to this effect the economy due to reduced cylinder condensation, and diminished ejection of sparks from the stack, the economy of the compound is still more marked, and it is evident that in elevated service the non-automatic compound loses a great part of these advantages.

Following out this reasoning, the order of my list of services will be justified. Unfortunately, if the simple locomotive uses the upper grades of expansion, some 40 or 50 per cent. of this steam will be condensed in the cylinders.

The saving of fuel by the compound locomotive is materially affected by its increased evaporation per pound of coal, which amounts to some 15 per cent. Added to this a saving of some 15 per cent. in steam consumption, it appears an easy matter to save 30 per cent. in coal.

In closing, I desire to refer to the claim made by many persons that the saving by compounds is due to larger boilers and higher pressures. There have now been so many trials of engines of both types with boilers and pressures the same, that this view is gradually being abandoned. I have myself conducted trials of simple locomotives with pressures of 140 lbs., 160 lbs., and 175 lbs., and have been unable to perceive any material difference in water consumption. Perhaps the most conclusive trials of this character were carried out by the Caledonian Railway in Great Britian, where the same engines have been tried with pressures varying from 150 lbs. to 200 lbs., over long periods in the same service. I have been informed by the late locomotive superintendent of that line, that their conclusion was that the most economical pressure for a simple locomotive is from 150 to 160 lbs.

The grand fact to remember in all of these considerations is that the compound locomotive can use as little as 20 lbs. of steam per hour per indicated horse-power, while the simple locomotive cannot use less than 27 lbs., and in passenger work such a result for the compound can be attained by avoiding a net loss of work between the cylinders.

The Chairman of the evening, Mr. Davis, called on Mr. O. F. Nichols to open the discussion of Mr. Dean's paper Mr. Nichols mentioned his experience with compound locomotives as General Manager of the Brooklyn Elevated Railroad. In 1890, or thereabouts, three engines which had been wrecked were changed to the compound system, of the two-cylinder type, constructed by the Rhode Island Locomotive Works. The experience with these was satisfactory, and in 1892 19 engines were built, all two-cylinder compounds, 16 from Rhode Island and three from the Pittsburgh Locomotive Works. They were about four tons heavier than the single expansion engines used on the system. Experience showed that they got up to full speed quicker than the simple engines and that they somewhat reduced the time between terminals, both of which results, however, may have been partly due to the greater weight of the locomotives The saving in fuel and water was probably 20 per cent., although the expert of the Rhode Island works claimed to have got 30. Along in 1893 complaints arose of the shock often experienced in starting trains with these engines, and, so far as Mr. Nichols explains, it was these complaints which led to putting these engines out of use for six months. Mr. Nichols judges that they were badly handled by the enginemen and that this was a matter of prejudice.

Mr. J. C. Platt asked what would be the relative results with the use of the compound on a level road and on one of their undulating grades.

Mr. Dean thought that the chances were that the results would be about the same, although the compound would not gain so large a percentage while running down hill owing to the reduced fuel consumption. In the use of one of his own engines on the Lehigh Valley road up the 96 ft. grade running out of Wilkesbarre, that engine pushes a train up the grade and then runs down empty. This round trip is made three times in 24 hours, but coal must be burned all the time. In this case the actual saving in coal as compared with the best simple engine is 16 per cent. and in water over 13.

Mr. Vauclain thought that under such conditions, that is, with undulating grades, the economy would be almost entirely a matter of loading. If the engines were running at the same cutoff we would get the same economy, so long as the speed was maintained. If the engines was loaded to the most economical cutoff on the level, and was using steam constantly from one end of the road to the other, we should obtain a better result on a level road. On a hilly road the engine would have to be loaded with regard to the maximum grade, and would be operated at a slight disadvantage on certain portions.

Mr. G. C. Henning introduced the question of the compound locomotives built for the Manitou & Pike's Peak Railroad, and Mr. Vauclain explained that when the Baldwin Works substituted compound locomotives for single expansion on that very steep road (maximum grade 25 per cent.) about 25 per cent. of saving was shown in water and 35 in fuel. The running time was reduced from 2½ hours to one hour and 50 minutes.

Mr. Davis (the Chairman) asked attention to the performance of a compound engine running on a run of 100 miles on the Chesapeake & Ohio Mountain Division where the profile is very bad, giving every variety of work, except running on level. Here the economy of the compound in freight, local passenger and express passenger was very satisfactory. Here also was found the advantage that the engine could be worked single expansion at will, thus taking a heavier load over the steep grades than a simple engine.

Mr. Vauclain spoke further of the advantage found on the Pike's Peak Railroad in the use of the so-called water brake. It was found that the compound was better adapted than the single expansion to this kind of brake.

Mr. Vauclain then proceeded to a more general discussion of the paper, although as he had been asked to

speak for five minutes, he questioned his being able to say in that time what ought to be said. The Baldwin Works has built over 500 four-cylinder compounds. When they began, the use of the piston valve was much criticised, and with regard to this he cannot agree with Mr. Dean. He finds no loss in using the piston valve due to the numerous apertures through which the steam must pass, and the restrictions placed on it free passes by the bridges. With the piston valve they get a much longer port with very little valve friction and can use steam pressures that would be impossible with the ordinary slide valve. He called attention to the fact that the Worsdell two-cylinder compounds on the North Eastern (England) are being converted into single expansion engines, and that piston valves are being used.

Mr. Vauclain then explained the underlying reasons which led the Baldwin Works to adopt the four-cylinder principle, which was done after examination of the systems of compounding in use in Europe and a study of the conditions to be met with here. It was decided that the four-cylinder system could be used with no changes to the locomotives except the cylinders, guides and crossheads; the internal arrangements and all inside the frames would remain the same. This system could be adapted to the heaviest as well as the lightest engines; to freight service and to the fastest passenger service; and this engine has brought forth the highest regular passenger speed in this country. The Philadelphia & Reading is using it exclusively for the fast Blue Line trains, and the Central of New Jersey is using the four-cylinder compound for the same work. The latter road had some single expansion engines built for this fast service, which were precisely like the four-cylinder compounds, except that the boilers were made 2 in. larger. It was found that the compound was still the more efficient, and the single expansion engines have been put to other work.

The numerous tests made by the Baldwin people on many examples of the more than 500 compounds turned out by them show economies ranging all the way from 10 per cent. to 43 per cent. This 43 per cent. economy was got where there was a 12-mile grade, 100 ft to the mile, with heavy curves and where the engines in comparison were loaded to their utmost capacity. The compound working full stroke very economically, and the single expansion engine worked at great disadvantage. The ratio between the cylinders which is preferred by the Baldwin Works is about 1 to 3; that is, 1 to 2.85. 2.90 or 3.

In coming to New York for this occasion he came behind a four-cylinder compound hauling a train of five vestibuled cars, and he times mile after mile in 48 seconds; this with anthracite coal and a comparatively small firebox.

The lowest water rate observed has been at low speed in freight service. The New York, Lake Erie & Western has got as low as 17½ lbs. of water per indicated horse power per hour. This was with very little loss between the cylinders and slight back pressure in the low pressure cylinder. In that service the most economical point of cutoff for the single expansion engines was found to be one-quarter stroke which gave about 27 lbs. of water per indicated horse power per hour. Cutting off at half stroke increased the water consumption very much and at shorter cutoffs the water rate was increased above that of one-quarter stroke. In the compound engine there was a variation of about two pounds in the water rate between ⅜ and ¾ cutoff. The indicator diagrams showed that the compound had a greater range of economy. It can be worked at various points of cutoff and still be economical. The single expansion could only be worked economically at one-quarter.

In reply to a question from the President, Mr. Vauclain said that 220 lbs, is the highest pressure used by him with compound engines. This was on the Chicago, Milwaukee & St. Paul. They built for that road some single expansion engines carrying 180 lbs., also one compound. The compound showed an average fuel economy of about 17 per cent. as compared with the single expansion engines of its class. Then Mr. Barr tried running the single expansions at 200 lbs. The compound was run also at that pressure. At 200 lbs. there was no end of trouble with the slide valves for single expansion engines. They got dry and cut. Then after a good deal of experimenting Mr. Barr succeeded in balancing the valves so at least as to get fair satisfaction. Then he found that there was a loss of economy in increasing the single expansion engine from 180 lbs. up to 200.

With the compounds and piston valves 235 miles have been run with a pint of cylinder oil. That was in high-speed passenger service burning bituminous coke, about the worst kind of fuel to be found for the valves.

Mr. Davis suggested that the comparison of 200 lbs. pressure on the simple engine with the same on the compound may be misleading, because in the compound the pressure is divided between two cylinders. The low pressure cylinder would have nothing more than receiver pressure on the back of its valve. He failed to see why a compound engine could not carry 220 lbs. with a slide valve as well as the simple engine could carry 150 or 160.

Mr. Vauclain said that would be true under certain conditions, but there are times when those conditions do not exist and then the slide valve gives trouble and the piston valve does not. With the piston valve they could use 300 lbs. steam pressure without any trouble.

Mr. Davis, although not now personally interested in any system of compound locomotives, has been interested in the testing of one recently which carried 220 lbs., with the ordinary slide valve. These valves were balanced part of the time with the American balance and part of the time with the Richardson. The ports were 23 in. long. For one month that engine carried in very severe service 220 lbs. boiler pressure, then for the remainder of the tests 200 lbs. Mr. Davis examined particularly the faces of the valves. There was no appreciable cutting and it was decided that the pressure was not excessive.

Mr. Dean has had something over 3½ years' experience with a compound carrying no less than 180 lbs. and a good deal of the time 195. During 3½ years' service the slide valves had never been taken out. Recently Mr. Henney, who succeeded Mr. Lauder in control of the Old Colony, desired to ascertain independently the relative merits of the compound and the single expansion. He had both engines shopped and they are being put into the very best possible condition. The valves of both engines were taken out with the idea of facing the valves and seats. The valves of the compound were in such good condition that the foreman was undecided whether to face them or not. The valves and seats were simply admirable. Moreover, in running the engine the engineer can move the lever with his left hand when steam is on with perfect ease. These valves have the Richardson balance.

Mr. Forney made his familiar arguments, as, for instance, in one test the engines were worked on a heavy mountain grade where, of course, the compound showed a saving; but the railroads of this country are not made up of continuous up-hill. He had seen a report of one or two compounds compared with 10 simple engines, but in examining the report it was seen that the difference between the performance of the best simple engine and the worst was greater than the difference between the compound and the average of the simples. In a great many of these tests the compound has had counsel for its side of the case; the simple has not. One gentleman in the discussion had said that in order to pull the maximum train on a heavy grade it is necessary to work the compound engine simple. Now, if you are obliged to keep a compound engine in better repair than the simple engine, if you are obliged to have a superior class of men to run it, if your engine will not pull your train on a maximum grade when working compound, these are very serious objections. Moreover, compound engines certainly do cost more than simple engines and they are heavier. He would take the extra weight and put it into the boiler; so get a larger boiler and increase the economy in the boiler itself.

Mr. Davis said the compound engine can utilize a boiler of high power to more advantage than the simple engine, so it is perfectly fair to give the compound engine the benefit of higher boiler power. It is an advantage to be able to work the compound engine single expansion when the service requires it, to get say about 25 per cent. more power for an emergency. It is perfectly legitimate that the compound engine should take advantage of this capability to overcome a grade by a sudden burst of power. This enables the engine to carry a higher average train load. As to the prejudice in favor of the compound engine Mr. Davis thinks that if Mr. Forney had ridden on as many compounds as some of us have he would find that the prejudice was exactly the other way.

Mr. Vauclain, in closing, said in reply to a question that the repairs to the compound engines on the Philadelphia & Reading are about 75 to 80 per cent. of the cost of repairs on the single expansion. In passenger service the ratio is rather better, the repairs being probably not over 60 per cent. This is not due entirely to the compound principle, the compounds having a slight advantage in larger wheels. The Baldwin people expect to save something in boiler repairs. In cylinder repairs there will be an increase in cost, although these are but a small percentage of the total locomotive repairs. Perhaps it may be said that the compound locomotive would cost about the same for repairs as the single expansion.

Mr. C. H. Quereau, Assistant Superintendent of Motive Power Burlington & Missouri River Railroad, sent the following as an addition to the discussion:

TWO-CYLINDER COMPOUND LOCOMOTIVES IN FREIGHT SERVICE.

Road Test with Dynamometer Car.—The following gives the principal results of careful road tests of two simple and two compound locomotives, made in freight service, with a dynamometer car, water meters, etc., in accordance with the code adopted by this Society, except that the steam calorimeters used were found defective in construction and the results obtained from them were not used.

The average results of the test will be found in Table 1.

The compounds were of the two-cylinder type, with a receiver in the smoke arch. A trip consisted of a run of 117 miles with 28 loaded freight cars, a different train being taken each trip. There were several 1 per cent. grades each way. The same engine crew handled all the engines, and the same testing crew of four persons took the records. All springs, gages and water metres were calibrated, coal from the same mine was used on all the the engines, and great pains taken to have all conditions as nearly uniform as posible. Table A gives the principal engine dimensions

TABLE I.—AVERAGED RESULTS.

Engine Number.	No. of Trips.	Dyn. H. P. Hrs. per Trip.	Water per Dyn. H. P. Hour.		Speed Miles per Hour.	Steam Pressure.
			Lbs.	Per cent.		
1 Compound	5	2,105	33.7	102.4	20.6	171
2 "	6	1.906	32.9	100.0	23.2	170
3 Simple	4	1,918	38.6	117.3	19.4	171
4 "	5	1,922	38.5	117.3	18.4	179

TABLE A.—ENGINE DIMENSIONS.

Engine.	Number 1.	Number 2.	Number 3.	Number 4.
Type	2-Cyl. Comp 10-wheeler.	2 Cyl Comp Mogul.	Simple. Mogul.	Simple. Consol.
Mean running weight, lbs.	220,000	172,000	182,000	175,350
Weight on drivers	118,000	98,000	106,500	101,860
Diameter of drivers over all	56"	62"	62"	49"
Cylinders, in.	19 & 30 × 24	20 & 29 × 24	19 × 24	20 × 24
Valve travel.	5½"	6"	5"	5½"
Valve	Plain bal	Plain bal.	Allan bal.	Plain bal.
Exhaust nozzle, dimetr.	5"	4⅞"	5"	5"
Diameter of boiler	58"	56"	60"	60"
Grate area, sq. ft.	31.3	31.5	31.5	34.7
Heating surface, sq. ft.				
Tubes	1,756	1,380	1,555	1,391
Fire-box	172	126	136	164
Total	1,928	1,506	1,691	1,555
Miles on flues	8,000*	7,318	5,941	42,231
Miles on fire-box	8,000*	133,322	56,526	150,353
Pops released at	185 lbs.	185 lbs.	185 lbs.	185 lbs.

* Estimated.

Because of the great differences in the distribution of the heating surfaces, and differences in their condition due to scale accumulated during varying periods of service, as shown in Table A, the evaporative efficiencies of the boilers and the coal used by the different engines are not comparable, and are not shown in Table I. It, however, shows that the conditions as to work done, speed, and steam pressures, were reasonably uniform for the several engines; that the compounds were more economical than the simple engines in the use of steam by 15 per cent.; that this saving was not due to the use of higher pressures for the compounds, and should therefore be attributed to the compound principle.

The figures given in Table I. for water used per unit of power developed are based on the assumption that all the water was used in hauling the cars. In Table II. is given the water used per unit of power developed in hauling the total load, which includes the engine as well as cars, based on the weights of the engines and cars. As the weights of the cars and their contents were taken from the stenciled weights on the cars and the bills of lading, Table II. should be considered as only a close approximation.

TABLE II.

Engine Number.	Water per dynamometer H. P. hour.	
	Lbs.	Per cent.
1 Compound	30 0	101 4
2 "	29.6	100.0
3 Simple	34.7	117.2
4 "	35.2	118 2

From the dynamometer records the average pull for each engine for all its trips was found, and indicator cards from each engine were selected which showed on the dynamometer record practically the same pull as the average. The average indicated water per I. H. P. hour was then calculated for each engine from these cards. The results are given in Table III.

TABLE III.

Engine Number.	Average pull of engine.	Pull for card.	Indicated water.	
1 Compound	8,340	8.600	16.92	17.20
2 "	7.520	7.500	17.50	
3 Simple	7.350	7.500	18.80	18.90
4 "	7,0 0	6,9'0	19.00	

Inasmuch as the indicated water is a fair basis on which to compare the efficiency of engines in expanding the steam used, it follows from Table III. that the steam was expanded by the compounds 9 per cent. more economically than by the simple engines. Table II. shows that the compounds used steam 15 per cent. more economically than the simple engines. It would seem just to believe that the difference between 9 per cent., the saving of the compounds due to better expansion, and 15 per cent., the total steam economy of the compounds, was due to a saving because of less cylinder condensation. That the effect of the receiver in the smoke arch was beneficial in reducing condensation there can be little doubt, but tests of compound engine 2 have shown that there was no superheating of the steam as it passed through the receiver. It seems reasonable to assume that, had the boilers of the compound and simple engines been the same, the economy of the compounds in coal would have been at least as great as their economy in the use of steam.

Records Made in Service.—In Table IV. are given results obtained from records made by compound and simple locomotives in regular freight service obtained from the roads owning the engines. In each case the compound and simple engines compared were identical except in modifications of cylinders and valve-gear made necessary by compounding; they were also operated on the same divisions and in the same service. The Chicago, Burlington & Quincy engines were run in the same pool, each engine crew taking each engine in turn.

TABLE IV.

Railroad	C., C., C. & St. L.		C. B. & Q.		C. & O.	
Period covered by records	9 months		1 month		1 year.	
	Comp.	Simple.	Comp.	simple.	Comp.	Simple.
Engines in service	1	12	1	40	1	19
Steam pressure, lbs.	180	180	180	160-180	155	150
Aver. train, loaded cars	24.7	24.3	31.6	25.1	35.1	36 1
Lbs. coal per car mile	3.7	4.8	3.27	4.6	3.7	4 9
Best simple coal record		4.2		3.85		4.4
Repairs per 100 miles	$3.90	$4.09	*		$1 61	$2.27

* Because of several changes in valve-gear, and a wreck, charged to repairs, it would be very difficult to determine the cost of repairs for the C., B. & Q. compound. It is the opinion of those having the engine in charge that her repairs cost no more than for the simple engines, if as much.

As in Table 1, the simple and compound engines used practically the same boiler pressure, and the difference in economy is due to the compound principle. Table IV. shows a saving in fuel for the compounds as follows:

	C., C., C. & St. L.	C., B. & Q.	C. & O.
Over average of all simple engines	23%	29%	25%
Over best simple engine record	12%	15%	16%

The Cleveland, Cincinnati, Chicago & St. Louis compound has been in service about two years; the Chicago, Burlington & Quincy compound about four years; and the Chesapeake & Ohio compound about two and one-half years.

Table IV. further shows that the compounds hauled as heavy trains as the simple engines.

Conclusions.—The writer would draw the following conclusions:

1. There are compounds in service which are more economical in the use of coal and water than simple engines of the same dimensions and doing the same work in freight service.

2. The minimum economy of the compounds is not far from 15 per cent. It is probable that about two-thirds of this economy is due to a better expansion of the steam, and about one-third to less loss by condensation.

3. The compounds have been in service too short a time to warrant final conclusions as to their cost for repairs, but the experience to date and theoretical considerations strongly indicate that this item will be no larger for the compounds than for the simple locomotives of the same dimensions and doing the same work.

A Gasoline Motor Inspection Car.

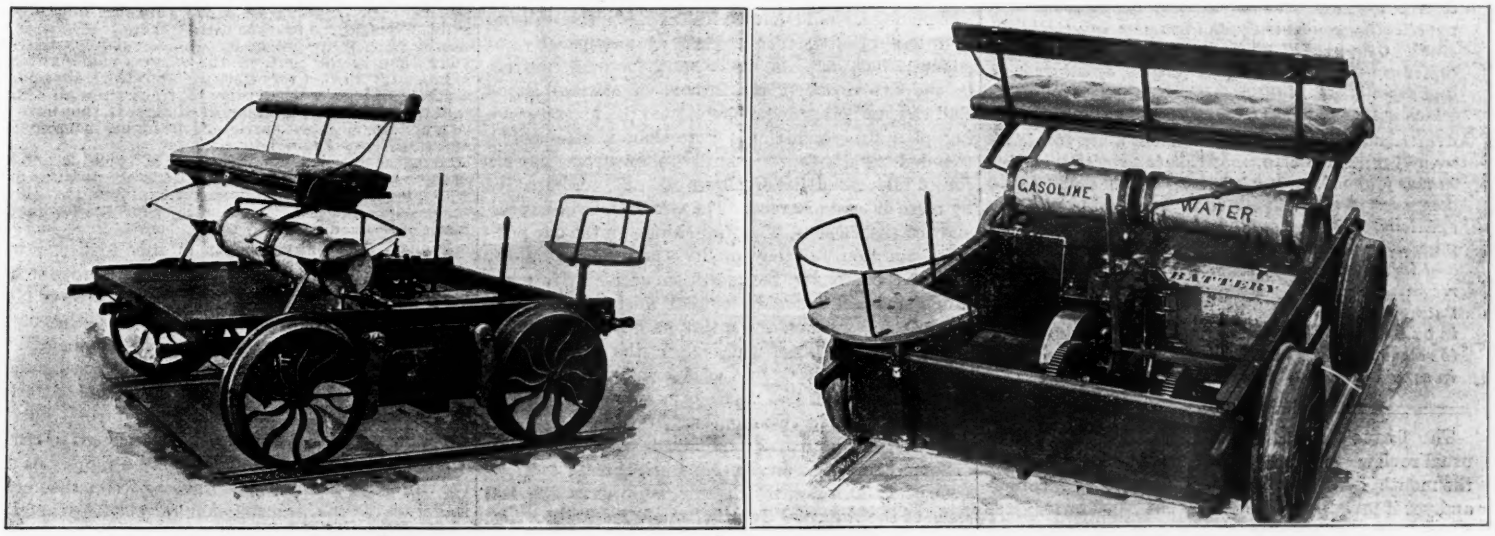
The Kalamazoo Railroad Velocipede & Car Co., has recently brought out a new inspection car propelled by a gasoline motor. The car seems well adapted to the uses of railroad officers making quick inspection trips where but two or three persons are to be carried. It is always ready for service, the engine being in motion after one turn of the balance wheel. The motor is con-

nected to the driving axle by two sets of gears, one for speed, the other for starting and for climbing grades; these are worked by friction clutches. The cars are furnished with motors of from 1 to 6 H. P. With motors up to 2 H. P a speed of 12 to 14 miles can be got on grades and from 20 to 23 on level track. Much higher speeds can be got with the more powerful motors.

The motor is of the 2-cycle type, having an impulse at every revolution of the crank shaft. The generator tank for a 2 H.P. motor holds about three pints of gasoline and this tank is supplied automatically from a storage tank, there being a regulating valve to keep the quantity in the generator uniform. A pipe passes through the top of the generator and terminates near the bottom, and on top of the generator is a gate valve. A pipe leading from the dome of the generator enters a check valve opening in the crank chamber of the engine. In operation, the piston ascends and sucks air through the pipe leading from the generator to the engine. This air passes through the pipe that passes through the top of the generator and into the gasoline and forms an explosive gas. When the piston descends and is near the end of the down stroke it passes an annular port and permits the exploded or burnt gases to escape which relieves the pressure in the cylinder. The gases in the crank chamber in the meantime being compressed by the descending piston, pass through a passage at the side of the cylinder connecting the crank chamber with the top of the cylinder, this passage having a check valve at the top, opening towards the cylinder, at the same time the spent or burnt gases of the previous charge are driving out. The piston compresses the charge when it ascends and when near the end of the up stroke the charge is ignited by an electric spark which causes the piston to descend; this is repeated at every revolution.

The quality of the gas is regulated by the gate valve on top of the generator. If the gas is too rich the gate valve is opened until the right mixture is delivered to the engine.

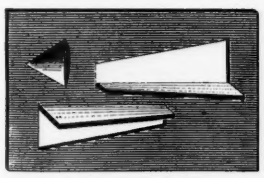
This motor is reversed by moving one lever. It can be run at variable speeds; it has no gasoline pump; it is light and compact. The 4 H. P. motor has a base of 15 in. square, and it stands 24 in. from the bottom of the base to the top of the cylinder. This uses one gallon of common stove gasoline per H. P. per day of 10 hours, working full power. It is considered entirely safe from fire or explosion, and is absolutely simple in operation. Every motor is subjected to five days' tests with brakes before it is shipped.



Kalamazoo, Gasoline-Motor Inspection Car.

The Fox Tie Plate.

This plate, which is made by the Avery Stamping Co., of Cleveland, O., is shown in the engraving, Fig. 1. As will be seen, the plate has longitudinal flanges which enter the tie in the direction of its grain, fastening it to the tie independently of the spikes. This prevents rattling and at the same time the flanges give the plate rigidity and stiffness; in other words, it is an attempt to do what the Servis plate does. The plate has an outside shoulder.



The engraving shows the method of forming the spike holes, and at the same operation, the flanges.

Foreign Railroad Notes.

The American system of checking baggage was introduced provisionally March 1 on the Berlin-Hamburg line of the Prussian State Railroads for the free allowance of baggage—that is, for 55 lbs. per ticket. There has been a good deal of discussion of the subject for years, and the railroad administration, which has been quite enterprising in introducing practices approved in other countries, especially in this country, seems to have determined to make a trial of it, which will enable the German traveling public to learn whether it suits their customs. The cheapness of cab hire, which enables a passenger with his trunk to reach a station for what it costs for his trunk alone in this country, renders the advantage of the check system less there than it is here; but if the baggagemen are permitted to weigh the trunks with their hands and omit the writing required by the prevailing German system, it will save the traveler much vexatious waiting at the baggage rooms.

The Prussian State Railroads during 1894 gave long-service allowances to 1,310 laborers who had served 25 years, to 277 who had served 35 years, and to 14 who had served 50 years. Moreover, seven of the oldest were decorated. These men do not belong to the class of regular employees, but are engaged as employees are here, liable to dismissal at any time. The allowances vary from 25 to 100 marks—$6 to $24.

When the German vestibule trains were first put on (1892-93) seats being sold as in our parlor cars, but only one mark (24 cents) being charged therefor, the receipts from this source were 30,636 marks during the year. The next year more trains of the kind were put on and the fee raised to 2 marks, and 352,054 seats were sold. Last year (ending with March last) the receipts were about 2,500,000 marks. Still more such trains will run this year and it is estimated that the seat fees will amount to 2,800,000 marks.

The 23,127 locomotives of the lines in the German Railroad Union in 1893 ran an average of 21,572 miles each, including switching, etc.; the average number of train-miles per locomotive being 13,665. The average earnings per train-mile were $1.43, and per mile of road $10,456 Of the total earnings 27.2 per cent. was from passengers and 70.7 from freight. The earnings per mile on the German roads in the Union were $12,458; on the Austro-Hungarian roads, $8,244, and about the same on the other Union roads (in Holland, etc.). The net earnings were for the whole Union $4,577 per mile and 5¼ per cent. of the cost of the roads.

The accidents reported for the year were 990 derailments, 560 collisions and 3,576 other casualties, by which 1,074 persons were killed and 3,604 injured, all but 46 o. the killed and 594 of the injured "by their own fault."

The average receipt per passenger-mile was 1.125 cents, varying from 0.935 cent on the Austria-Hungarian lines and 1.173 cents on the German lines to 1.356 on the othe lines. The average fares for the different classes of passengers were, in cents per mile:

	Class— 1.	2.	3.	4.
Germany	3.039	1.912	1.135	0.789
Austria-Hungarian	2.120	1 398	0.784	0.734
Other	2.322	1.854	1.128	0.842

The average freight rate was 1.325 cents per ton-mile on the German railroads, 1.344 on the Austria-Hungarian, 1.277 on the other Union railroads, and 1.326 on the average for all Union railroads.

Last winter a track was laid over the ice in the Volga, and trains consisting of a locomotive and 10 loaded freight cars passed over it daily.

Since the introduction of a new and lower passenger tariff on the Russian railroads, the travel on the St. Petersburg & Moscow line is said to have increased 30 per cent. An average of 3,000 passengers leave the St. Petersburg station daily; about Christmas there was an average of 4,500 daily, and it was purposed to order 20 new express locomotives and put on additional trains. Considerable delays to trains are reported owing to the inability of the ticket-sellers to give out tickets fast enough, the system being unfamiliar, while the business was greater.

An ironworks in Prague has contracted to deliver 10,000 tons of iron ties for the Siberian Railroad. The freight will amount to $18.70 per ton to the western terminus of the Siberian Railroad. While there is a vast deal of timber in Siberia, there are long stretches of country without forests.

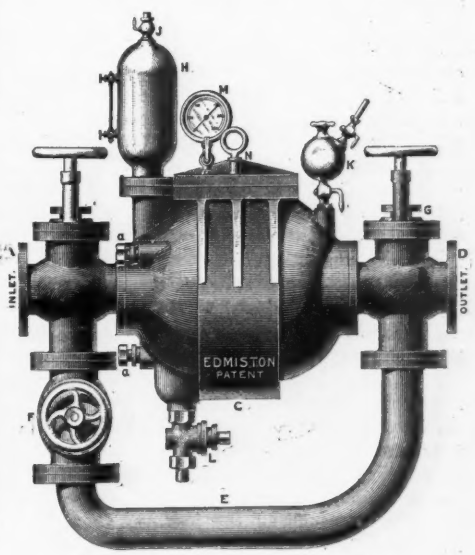
In Spain last year 286 miles of new railroad were opened, 155 miles of it of narrow gage, and the remainder of the national 5-ft. 6 in. gage.

The Edmiston Feed Water Filter.

The Wheeler Condensing & Engineering Company, of New York City, is offering a novel filter for cleansing feed water for boilers that will be useful in some localities where railroads find it necessary to filter feed water to reduce locomotive boiler repairs. It is claimed for this filter that it will remove grease, sand and other foreign matter that is injurious to boilers. The illustration shows the type that is used on the steamers "Majestic" and "Teutonic" of the White Star Line.

The feed water enters at the opening *A* and passes directly into the body of the filter through a series of chambers separated by diaphragms of filtering material and thence out through outlet nozzle *D* to the boiler. The by-pass pipe *E*, and valves *F* and *G*, are for use when the filtering material requires cleaning or renewing, thus permitting a continuous operation of the feed-pump. The filtration is effected by the feed-water first passing through a perforated plate, then through coarse cloth, the latter being held in place and supported by a perforated brass plate, then through another series of chambers separated by similar diaphrams of filtering material, but of finer texture.

The plates to which the filtering materials are secured are carefully fitted and securely held in place by set screws *a*, thus insuring water-tight joints. The air chamber *H* is provided with scum cock *J*, which is opened when the glass water gauge indicates an accumulation of oil. The soda cock *K* is fitted with a steam connection for the purpose of removing oil and dirt from the filtering material by boiling and blowing out through the sludge cock *L*. The gauge *M* indicates the pressure in the filter chamber, the normal pressure being between 2 and 5 lbs. above boiler pressure. When the pressure rises above 5 lbs., the by-pass connection is opened and the filter inlet and outer valves are closed, thus allowing the feed-water to reach the boiler or tank without going through the filter while the latter is being cleaned.



The Edminston Feed-Water Filter.

RAILROAD GAZETTE

ESTABLISHED IN APRIL, 1856.

Published Every Friday

At 32 Park Place, New York.

EDITORIAL ANNOUNCEMENTS.

ontributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

The financial journals published last week their usual review of the gross earnings of the railroads for the month of April. An improvement is apparent, and yet it must be remembered that April of 1894 was a very lean month indeed. Business was greatly depressed, the strike on the Great Northern had tied up that road, the Coxey tramps had begun their operations, and the bituminous coal strike had begun. April of 1894, as compared with the preceding year, showed a *decrease* of 14.86 per cent. in the gross earnings; this year, according to the returns collected by the *Chronicle*, the *increase* is 4.65. This is for 125 roads and 96,460 miles; and the aggregate of the earnings is nearly 37 millions. For the four months of the year, and aggregate earnings of over 145 millions, the increase in gross is 1.03. Naturally, the comparison with so poor a month as April, 1894, is only moderately conclusive, but there are many signs of returning prosperity, slow though it may be in coming. Naturally, the grain-carrying roads are still suffering heavily, as is indicated by continued decreases, which amount to over $235,000 for April on the Rock Island, and $203,000 on the Milwaukee & St. Paul. The receipts of corn at Chicago in four April weeks of 1895 were 3,465,000 bushels, as compared with 8,810,000 in four weeks of 1894. The falling off in receipts of oats was also very great, and the receipts of wheat were 5,187,000 bushels against 7,177,000 the year before, and against 11,391,000 in the four weeks of 1893. The live stock receipts at Chicago also fell off seriously. In the South the railroads are continuing to profit by the large cotton movement, the overland movement having been 119,000 bales, against 75,000 last year, and the receipts at Southern ports 299,000 bales, against 199,000 the year before. Naturally, the largest increase in April is shown on the Great Northern, where it amounts to about $436,000. The Northern Pacific comes next with $237,000, then the New York Central with $177,000; the Missouri, Kansas & Texas, $119,000; the Illinois Central, $102,000 and the Cleveland, Cincinnati, Chicago & St. Louis, $101,000. These are all of the increases above $100,000. The decreases of more than $100,000 have already been mentioned.

A Buffalo paper reports that on a certain railroad the manager proposed recently to adopt the plan of discipline (described in the *Railroad Gazette* of March 15, by Mr. Darlington, of the Pennsylvania), in which employees are not suspended for misdemeanors, and had arranged to put it in effect on the first of May, but that the old plan will be continued because "opinion was too strong against the new system." It must be assumed, we suppose, that the employees, having been asked for their views, found themselves unable to believe that the superintendent would not cheat them once in a while by entering demerits against a man without his knowledge. It will be remembered that some of the employees on Mr. Darlington's division objected to the change. Evidently there is a considerable percentage of the men who prefer to put up with a severe punishment, if they can know when it is over with, rather than suffer a lighter infliction which they feel that they must keep on their minds. It is to be hoped that the men who have worked under the new system and who like it will tell of its advantages, for it is not only more satisfactory, all around, but is also more rational. The feeling of these objectors is based, doubtless, on the false notion that a "lay-off" of 30 days, more or less, squares the account between the offender and the company. But it does not; the offense which warranted the suspension is one of the elements which, if others follow, go to make up a ground for discharge; and it is or should be counted just the same, whether the suspension is enforced or is only charged on the book. A great many employees—and, we fear, some superintendents—have got the idea that the main reason for a suspension is to stop a man's pay, especially in cases where the company saves a little money by the temporary change; but of course no considerate and business-like manager would suspend a man for this reason. The loss of wages is a part of the penalty, of course; but, as has beeen satisfactorily proved, in the experience of Mr. Brown, of the Fall Brook Railway, and others who have tested the non-suspending plan for years, this is more than neutralized by the evil results that generally follow from the enforced idleness of the employee at fault, accompanied by more or less disgrace. The ethics and the expediency of suspensions, therefore, hinge on the one principal question. Do they produce or promote on the part of the offender, the reflection necessary to make him do his best to avoid a similar mistake or lapse in the future? And on this point, as on the other, the lesson of experience is decisive. If the right understanding exists between the superintendent and the employees, a man can "turn over a new leaf" in two days, as well as in two months.

Some comments on the Missouri, Kansas & Texas code of train rules, which was noticed in the last issue of the *Railroad Gazette*, are offered by a correspondent whose letter appears on the first page of this issue. The criticism presented in his last paragraph is readily answered; the M. K. & T. rules do require the brakeman to use the air signal. When the air brakes have been properly applied on all the cars, and they are found to be in good order, he is to stand on the rear car and notify the engineman by four blasts on the air-whistle. This would seem to be a sufficient safeguard against such an accident as our correspondent refers to. If the brakeman by carelessness produced a single blast it should convey no order to the engineman to start the train, for he would have no authority to do so until he heard the four blasts. Obviously, the brakeman should not go under the cars before the coupling and testing process is begun, nor after it is finished. The criticism of Rule 524 C seems to be well taken. The liability of an operator to accept an order for a train on the assumption that the train is at the station, when, in fact, it has got out of his reach, would seem to be sufficiently provided for by the third paragraph of rule 521, which requires him to see and speak to the conductor and engineman before he gives O K to the dispatcher. (In our account of the M., K. & T. rules we wrongfully gave that road the credit for adding this paragraph to rule 521. It was added by the Association in April, 1894.) If the signers affix their names to the order before the dispatcher has given O K to it, they are still bound to read it again after he has verified it, and the first reading would be likely to lead them to be careless about the second. If the operator found it necessary to make any alterations he would have to explain them, which would involve needless delay, and open the way for false excuses in case any mistake should subsequeutly be made.

Our correspondent's commendation of the M. K. & T. rules is in general justified by the excellence of the clauses commended, but some of his statements are rather too sweeping. The rule requiring second and third class trains to approach all stations under control (95 A) is in good form (except that it does not say anything about station limits), but it is not to be recommended to all roads indiscriminately. On some roads many stations ought to be excepted; and the rule is of doubtful value on any road, except where the superintendent adopts it of his own motion, as it were; adopts it with the deliberate determination to see that it is constantly respected. This rule is one of a class that are very frequently violated, and it should not be adopted unless there is a specially energetic officer who believes in the rule so thoroughly that he will constantly look after its enforcement. Rule 99 B is an intelligent amplification of the flagging rule, and deals with a point which is highly important, if dependence is to be placed upon the time interval and flagging; but why not adopt the space interval, and relieve the pressure on Rule 99?

The Uses of Mathematical Diagrams.

It seems pretty late in the 19th century to be called on to make any defense or explanation of the uses of diagrams in the investigation or elucidation of mathematical questions, simple or complex; and yet we suppose there are some persons who resent a diagram, as does the writer whose feelings are expressed in the quotation below. We quote from a magazine "devoted to the theoretical, mechanical and financial interests of the electrical transmission of power."

"A new mathematical fad seems to have sprung into use in the last two or three years among what it is supposed may be called the advanced class of electricians. We refer to the mathematical diagram. . . . The style of diagram we have in mind is the one composed of beautiful circles encompassing the most severe sort of angles, triangles, straight lines and little quirlques, all beautiful to look at and doubtless meaning something, for are they not mostly used by some of our college professors? . . . Now, we want to enter our protest right here againt a too free use of these methods, for it would be easy to prove them to be entirely useless to more than 99 per cent. of the various readers. . . . While a few men, a very few, are able to retain enough of their college mathematics to trace through simple equations and the plainest sort of algebra, they have not retained the slightest particle of the higher mathematics, and much less know how to apply them. . . . The true mathematician displays pages of calculus and diagrams, but works out his solutions in private, after which he uses simple language in explaining his theory to outsiders, retaining the equations for the few mathematicians who demand them."

Perhaps it would be a waste of time to discuss with the editor who wrote these astonishing words the utility of diagrams in representing the relations of facts. Obviously his ignorance is as abysmal as that of the Turkish Pasha who argued that the Nile could not rise south of the equator, "for we all know that water can't run up hill." It was an unfortunate day for that Turk when he accepted the doctrine that the earth is round, for he learned just enough to reason wrong, and not quite enough to reason right. And so the editor of the journal "devoted to the theoretical interests of the transmission of electrical power" would have done better to stop his mathematical reading at long division, unless he carried his excursions a little way into the field of analytical geometry.

Still we hasten to quiet his alarms about the "new mathematical fad," which has begun to disturb him within the past two or three years. In fact, men have represented quantity by diagrams for unknown centuries, and in 1637 Descartes introduced the method of making the "plainest sort of algebra" still plainer by the use of co-ordinates; and he made conceptions, which otherwise are quite impossible to the ordinary mind, as clear as noonday. This he did by those pesky diagrams, those "beautiful circles . . . and little quirliques" (we prefer curlicue, but that is a trifle).

Now what are these diagrams with which the editor quarrels? They are simply pictures of facts or the relations of facts. They show pictorially what may be expressed by tables or formulas or written descriptions. They bear about the same relation to tabulations and written statements that a picture of a scene bears to a printed description of it. The diagram can be read, understood and remembered longer than any printed statement.

Instead of being solely the expressions of the "higher mathematics," and used mostly by college professors, they are oftenest used to show matters derived from observation, or from simple arithmetical and algebraical calculation. They are used by railroads to represent train movements, the use of supplies, and variations of traffic; by trade journals and tradesmen to show the fluctuations in prices; by manufacturers to show output at different times and under different conditions; by boiler owners to show variations in steam pressure at different hours during the day, and by popular journals and magazines to illustrate simply and clearly the variations in population, death rate, water supply, food consumption, etc.

All these diagrams have the same simple elements which are understood by all intelligent readers whether mathematicians or not. If a man of ordinary intelligence has any difficulty in comprehending the full meaning of a diagram, it is not in reading the diagram, but in grasping the meaning of what it sets forth. For defects of this sort the diagram is not responsible any more than the alphabet is responsible for the failure of an ignorant person to understand a printed sentence. Furthermore, no English expression can be written that will give so complete, simple and concise a statement of a mathematical fact as is expressed by a diagram. This sort of expression of facts and relations is one of the greatest time-savers that has been introduced in technical literature in this age of investigation, in which we are confronted with the results of the labor of

hordes of students; and we earnestly recommend to the editor of the journal of electrical transmission to practice this method of clarifying his own ideas and of insinuating into the minds of his readers some of the results of his valuable studies.

The Effect of Negative Lead on Locomotives.

There is a good deal of talk now about the advantages of the use of negative lead for locomotive valve motions, and some have gone so far as to say that it is an improvement in every way. The more conservative claim that it reduces the compression and has no detrimental effect on the port opening. Some have said that negative lead in full gear reduces the port openings at short cut-offs, but that this reduction can be offset by giving a corresponding increase to the positive lead in the back gear. The extent to which this has been carried will be understood from the fact that some Western roads are using $\frac{3}{16}$ negative lead; that is, the valves are set $\frac{3}{16}$ "blind," instead of $\frac{1}{16}$ open, in full gear, as is customary. One road uses $\frac{5}{16}$ negative lead in the forward gear and $\frac{5}{16}$ positive lead in the back gear; this, of course, changes the forward motion at the expense of the back motion.

There is nothing mysterious about the action of lead on a link motion, although it is true that the small variations, that are immaterial in this consideration, can only be determined accurately by the use of a model, or by making very extended mathematical calculations; yet, for all purposes of practical examination, the effect of different amounts of lead can be studied from a very simple diagram. Fig. 1 is such a diagram. The large circle may be taken to represent both the crank circle and the maximum throw of the eccentrics; a difference in scale only is needed, and this is arranged by having a scale at the top of the diagram divided in 24 parts, representing the stroke, and one at the bottom of the diagram, divided into 5½ parts, representing the maximum throw of the eccentrics, or the travel of the valves.

The detail analysis, which would prove the approximate correctness of this diagram, it is not necessary to give here; it can be found in "Valve Gears for Steam Engines," by Prof. Peabody, or "A Treatise on Valve Gears," by Zeuner. The simple construction, without reasons as to the exactness, is as follows:

Draw AK equal to the lap and lead and draw AB vertically. Lay off BC equal to $\frac{1}{4}$ the distance between the eyes of the link divided by the length of the eccentric rod, from the center of the strap to the center of the eye and multiply by the cosine of the angle AOK. Draw a circle through A and C with its center on an extension of the line CE. Select any cut-off as 6 in. and draw the position of the crank as LO. Draw a circle with the radius OM equal the outside lap. From M draw a perpendicular MJ and where it crosses the arc AC, as at H, will be the outer extremity of the diameter of what is known as the "Zeuner valve circle," which may then be described as $HMOFC$. This is explained in almost all books on valve motions. The pecular property of this circle is that it gives the opening and closing of the valve for all positions of the crank in a very simple way. Thus, when the crank is at N, HP represents the valve opening. The valve is closed when the crank is at L, which is the cut-off point, and the valve opens when the crank is at Q, as shown by the crossing of the two circles at F. The full line, on Fig. 1, shows the valve circle for a 6-in. cut-off; and the exhaust opening and closing, when, with a 5½ in. maximum valve travel, there is $\frac{7}{8}$ outside lap, no inside lap and $\frac{1}{16}$ lead in full gear for both forward and back motions. The dotted line gives the same information when the eccentrics are set so as to give $\frac{3}{16}$ negative lead in full gear for both forward and back motions.

The results of changing the lead are that the admission is changed from F before the crank reaches a dead center to the point G after it has passed the dead center. The maximum port opening at 6 in. cut-off is changed from HP to H_1P_1. The point of exhaust opening is changed from a to a_1, and the exhaust closing, or the commencement of compression, is changed from b to b_1. The valve will not open at 6 in. cut-off until the crank has passed the dead center. The exhaust and compression is about 2½ in. later in the stroke. The really deterimental effects are the late opening of the steam port and the greatly reduced total opening, which may be seen by comparing the distance HF with the distance H_1P_1.

To study the effect of inside clearance, that is, the cutting out the inside of the valve, let it be assumed that ¼ in. is taken out on each side and draw a circle with the radius of ¼ in., or OR, and draw OS and OT through the points where this circle crosses the valve circle. The effect of this is to give an earlier exhaust as at S and a later compression as at T, without in any way interfering with the point of admission of steam or the maximum opening of the steam valve. The only point about this that can be criticised is the early exhaust, and any criticism must be based upon the actual distribution of steam as shown by the indicator cards and not on any supposed effect which such early exhaust may have. That the effect is not in the least detrimental is shown by two indicator cards, Fig. 2, taken at a high speed from a locomotive having ¼-in. inside clearance on each side of the valve. These cards show that the steam admission is so much restricted that the port opening, which is represented by HP, should not be reduced to H_1P_1, but should be increased if possible.

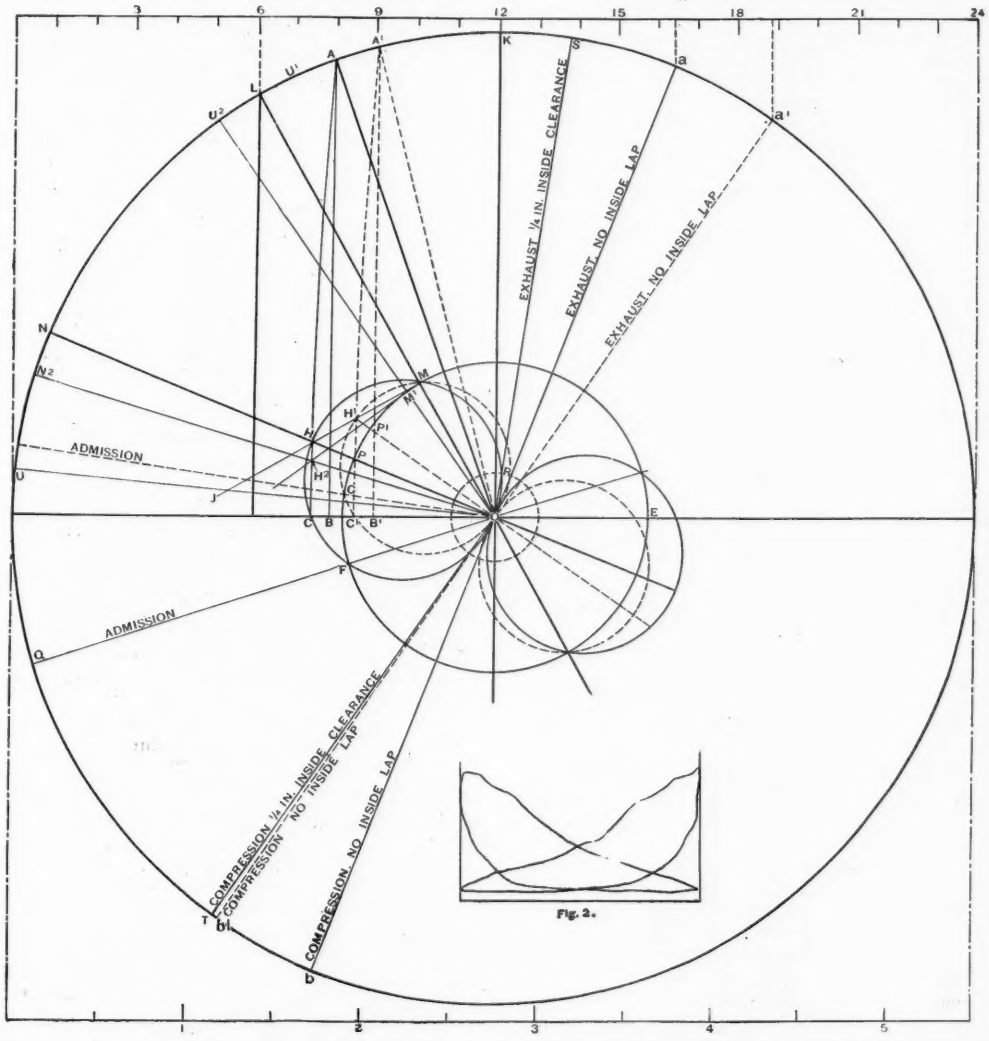


Fig. 2.

As to the effect of giving the back motion an excessive positive lead to offset the bad effects of negative lead in front gear, or to improve the front motion when there is a positive lead in front gear, which is an old trick to make a "smart" engine in front gear, the diagram Fig. 1 will show approximately the results.

Ordinarily the line drawn by bisecting the angle of the eccentrics with each other coincides with the crank, but when the lead is different in the front and back gears, these lines do not coincide with the crank, and where there is negative lead in the front gear and positive lead in the back gear, the crank is ahead, in the direction of motion, of the line bisecting the eccentric, and to study the motion it is only necessary to take the diagram Fig. 1 and consider the crank displaced, from the crank there represented, by the angle which it is ahead of the line bisecting the eccentrics. It is equivalent to putting on two cranks, one which shows how the motion would be if the crank coincided with the bisecting line, and the other showing the position of the real crank. In the Fig. 1 OU may be taken as the real crank. When the bisecting line has reached the position OL, the real crank will be ahead as at U_1. L is the actual cut-off, but the crank position is U, which gives more than 6 in. cut off. To make the cut-off 6 in., so as to make a comparison, $LU2$ must be laid off equal to LU_1, and the line OU_2 drawn and a perpendicular erected at M_1. Where this crosses the arc AC, as at $H2$, is the extremity of the diameter of the new valve circle. OH is greater than $OH2$ and therefore the maximum port opening will be less and the valve will be at the full maximum opening a little earlier in the strike as at $N2$.

The effect on the exhaust opening and compression is very little and hardly changes those points from the positions they have with equal positive lead when the cut-off is the same in both cases, and practically the only thing that results that is of importance is the injurious effect on the back motion due to giving an excessive positive lead.

It has been claimed that the maximum port opening occurring at $N2$ which is earlier than N, is an advantage, but this is doubtful for the reason that the piston at that point is moving very slowly and is very near the end of the stroke and steam is not taken in so rapidly as later at N, where the piston is moving faster.

The angularity of the connecting rod makes some difference in the position of the piston, so that the positions given in the diagram are not strictly correct, but these can be corrected by referring to tables showing the effect of the angularity of the cranks. These tables are given in any good book on valve gears. For the purpose of comparison, however, the positions N and $N2$ may be taken as correct and if a diagramatical analysis of this kind does not show an improvement in the motion, much cannot be expected from the small differences that will be found in the position in the actual locomotive.

Those who are slow about taking advantage of the very great improvements in high speed engines brought about by inside clearance may find some temporary satisfaction in using negative lead, but in the end they may return to the good old-fashioned positive lead and the comparatively new plan of inside clearance just as it is now being used by the Pennsylvania road and other important roads, and as was first used (to any considerable extent) by Mr. Paxson, Superintendent of Motive Power of the Reading road, an account of which was given in the *Railroad Gazette* March 18, 1892.

The Stresses in Car Axles.

Continued from page 285.

Determination of Actual Instantaneous Loads.—It is more difficult to determine the maximum stresses that produce initial cracks than to determine the stresses that are repeating and cause fatigue of the metal. The thumps due to the closing of the springs, the shocks due to frogs and turn-outs, and the passing of wheels through close track, as in the case of wheels that have been put on with thick flanges for 4 ft. 9 in. gage, produce a class of sudden stresses that it is impossible to calculate with much satisfaction. In the case of wheels not properly gaged for the track on which they are designed to run, the effect of the continuous reversal of stress as the wheels revolve must be in some cases sufficient to quickly weaken the axle by straining it frequently above the safe limit, even if an initial crack is not produced. The stress produced by flange pressure is between the wheels and not on the journal, and as breakages from initial cracks more frequently occur at the journal there is reason to believe that the result of flange pressure is more frequently a fatigue of the axle at or near the center, by repeated stress, than an initial crack.

It is, of course, impossible to tell what the stress is that

is produced by running improperly gaged wheels in standard track, but the stress is sufficient, as may be shown by an approximate calculation, to give a reasonable explanation for the increased number of breakages of axles at the center when wheels are run on 4 ft. 8½ in track, while gaged between flanges for a 4 ft. 9 in. trac when the wheels have thick flanges.

The effect of flange pressures must be considerable, fo each pound pressure laterally on the flange produces bending moment at the center of the axle equal to a jour nal load on both sides of the car of 1.7 lbs. applied at th center of the journal, or 1.45 lbs. applied at the point mid way between the center and the end of the journal This is with 33-in. wheels; with 36 and 42-in. wheels it i greater. The causes of flange pressure are numerous and it is impossible to say what they amount to. Win pressure on the side of the cars gives a considerable flange load. It may be taken as 20 lbs. per square foot over the surface of the car, or, as this load is carried by four flanges on freight cars, it may be taken as 5 lbs. per square foot over the surface of the car for each flange. This gives a lateral flange pressure of 1,700 lbs. and causes a bending moment at the center of the axle equal to a load of 2,500 lbs. applied at a point midway between the center of the journal and the end. This is for a 34-ft. car and for a wind of about average velocity in stormy weather in open country.

Each pound on a ten-degree curve at 30 miles an hour has a centrifugal force of $\frac{1}{4}$ of a pound, and this may be taken as the maximum that would occur in service with a defective track where there was not much, if any, elevation of the outer rail, and may be taken to include some of the small oscillations that occur laterally of the truck between the rails, but would not include any flange pressure that might arise from bad mating of wheels. That there is considerable flange pressure which has to be added to the other stresses in the axle is shown by the fact that there are many worn and sharp flanges.

In many cases the initial crack is undoubtedly due to the thump that occurs when the wheels drop into or when coming out of a low place in the track. There would be more cases of such cracks, especially in cold weather when the ground is frozen, if it were not for the important fact that the blow due to the sudden stopping of the downward movement of the car and load when the springs close is softened by the spring of the bolsters and truck frame. Tests of these parts show that the side frames will spring down about ⅛ of an inch under a load of 10 tons, and the bolsters will spring downward about ¼ of an inch under an increased load of 20 tons. Some bolsters are stiffer and others have more deflection than this. Therefore when the springs close there remains the springing of the bolster and side frame to reduce the intensity of the thump on the journal. The deflection of these parts acts like a spring having a stiffness that gives 20 tons resistance at ⅛ of an inch deflec-

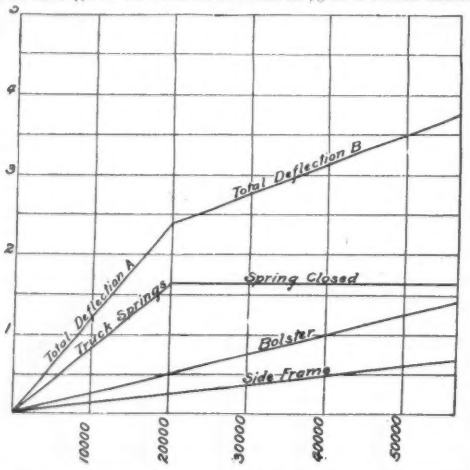


Fig. 8.—Deflection of Truck Springs, Frames and Bolsters, 60,000 Car.

tion, which corresponds to 26,700 lbs. per inch for each journal load. The stiffness of the truck springs is about 12,000 pounds per inch for each journal load. The deflection or spring of the axle is so small that it has been omitted.

Fig. 8 shows the approximate deflections of the truck springs, truck frames and bolster under different loads. The line marked "total deflection" shows the deflection of all the parts together, before and after the springs close. These are drawn to suit an average 60,000-lb. car. When the ordinary thump occurs the deflection per ton of load changes from the line *A* to line *B* and it is equivalent to a sudden change in the stiffness of the springs. To learn what is the pressure imposed on an axle due to a given thump, we must assume some deflection of the side frames and bolster, or some definite vertical velocity of the body of the car in a downward direction when the springs close. Probably the common thump is no more than that which would be given by the drop of the car when the wheel had fallen into a low place so far that the springs were just relieved of load, when the load is sufficient to just close the springs when the car is standing still. Such a condition is shown by Figs. 9, 10 and 11, and would cause a large, sudden fibre stress. The revolving of the axle no doubt often prevents sudden breakage, and tends to reduce the initial cracks.

Fig. 9 shows two springs *A* and *B*. *A* represents the truck springs and *B* a spring that is the equivalent of the spring of the truck frames and bolster. In Fig. 10 the springs are deflected with the normal load, which is assumed to be sufficient to close the truck spring solid, as shown. Fig. 11 shows the lowest position of the load due to oscillation. It is taken as that which the load would reach in falling from the position in Fig. 9, where the truck spring is just free. This assumption is, of course, arbitrary and corresponds with the facts only occasionally in service. It may or may not indicate the most severe stress that occurs in service, but it does represent a stress that does actually take place at times.

The load to close the truck springs when they have been in use and have some permanent set may be taken as 40,000 lbs. per truck or 10,000 lbs. per journal for 40,000-lb. capacity cars, and as 52,000 lbs. per truck or 13,000 lbs. per journal for 60,000-lb. capacity cars. These, again, are arbitrary figures, but as cars

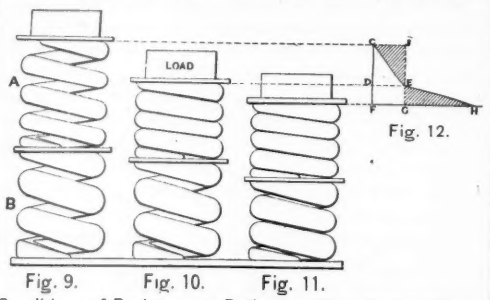


Fig. 9. Fig. 10. Fig. 11. Fig. 12.

Conditions of Resistance to Deflection When Springs Close.

are often overloaded until the springs are closed up and springs frequently take a permanent set, the figures are within the limits of the stress to which axles are subjected under the unusual conditions that are now being considered. That is, we are now looking for the "actually greatest" stress that Whöler warns engineers to allow for. In cars of this kind the total motion of the spring, which was originally about 1¾ ins., will have been reduced to about 1 in.

The extent of the deflection of the spring *B*, which represents the truck frame and bolster, is found by drawing a diagram like Fig. 12, in which *C D* represents the 1-in. motion of the truck springs and the deflection of the side frames and bolsters taken together, as in Fig. 10, and *D E* the load to close the truck springs as in Fig. 10. When the area *C J E* equals the area *E G H* the distance, *F H* represents the instantaneous journal load and *D F* shows the deflection of the truck frames and bolsters. The inclination of the line *C E* represents the stiffness of the truck springs and truck frames and bolsters taken together. The inclination of the line *E H* represents the stiffness of truck frames and bolsters only. The instantaneous journal load is found as follows:

	60,000 lb. capacity cars.
Assumed journal load to produce condition in Fig. 10=D E	13 000
Deflection of truck springs	1 in.
Deflection of frames and bolsters	.49 in.
C D=	1.49
Area C J E=½ C D × D E	9,700
Area C J E=½ G H × E G=13,350 $\overline{E G}^2$	
G H=26,700 × E G	
Stiffness of truck frames and bolsters	26,701 per in. deflection.
E G=the square root of $\frac{2 \text{ area C J E}}{26,700}$	85 in.
G H=E G 26,700	22,600 lbs.
F H=13,000 + 22,600=	35,600 lbs.

The fiber stress in the 4¼ × 8-in. M. C. B. axle from this load is about 25,000 lbs. at the journal neck on a new axle and is enough to start an initial crack in worn axles. This stress is not the maximum that may be expected from the thumps due to the closing of the springs on overloaded cars, especially when a wheel is rising quickly out of a very low place in the track.

If the truck frame and bolster were stiffer than that assumed, the resulting load on the journal would be greater. This calculation shows that, owing to the weakness of bolsters and side frames of trucks, the axles are less strained when the springs close than they would be with the European cars on which the load is brought directly on the axles when the springs close. However, in European cars the springs have much more motion, and this reduces the maximum stress. This calculation further shows that with rigid frames and bolsters the springs should have more motion so as to prevent closing if possible.

[TO BE CONCLUDED.]

The taxable value of all the real estate in England and Wales has been made the subject of a special return to the House of Commons, on an order passed at the instance of Mr. Shaw Lefevre; and the officer of the Local Government Board who makes the report says that the most important feature brought to light by it is the growth in value of other property than land, and especially of railroads. The higher assessments of railroads have, in a very large number of Unions (groups of towns) made up for the reduction in the value of land, which has been brought about by the agricultural depression. The report makes comparisons with 1870, and the principal totals for the whole of England and Wales are as follows: 1870, £104,870,000; 1894, £161,081,000; increase, £56,211,000, or 53.6 per cent. In 1870 land constituted one-third of the whole, buildings a little more than one-half, and railroads about $\frac{1}{20}$; in the 24 years since 1870, land values have fallen off 1.5 per cent., buildings have increased 86 per cent., and railroads have increased 184.8 per cent., their rateable value now being £13,871,050, or one-twelfth of the whole. This sum is 78.3 per cent. of the estimated gross rental value of the railroads, which is £17,708,567. The reduction in the value of land does not show the total falling off, for the agricultural counties near the towns have held their own or have lost but little. Particulars of the great increase in assessment of railroads, which affords marked relief to the rural taxpayers, are given as follows: In the Union of Newbury (Berkshire), the assessment of railways has increased from £789 in 1870 to £6,241 in 1894; in that of Wokingham from £6,700 to £33,000; in Cookham from £8,500 to £31,600; in Newmarket (Cambridge) from £1,300 to £14,400; in St. Austell Union (Cornwall) from £856 to £9,800, the population remaining stationary; and in Poole (Dorsetshire) from £854 to £12,200. In Biggleswade Union (Bedfordshire), where the population has been stationary and the rateable value of land has fallen by £20,000, or 25.6 per cent., the assessment of railways has increased from £14,000 to £52,000, and has more than made up for the reduced assessment of land. In Billericay Union (Essex), where the increase of population has been only 15 per cent. and the value of land has fallen 44 per cent., the assessment of railways has been increased from £3,400 to £23,100, and the total assessment of property in the Union has been more than maintained. There are two Unions where the assessment of railways is more than half the whole assessment of all the property in them.

The letter from Chicago in our traffic column to-day contains two items of special interest. The first is that noting a big defection in the Chicago Car Service Association. This is only a confirmation of what was foreshadowed several months ago, but the fact needs to be noted as a warning that demurrage associations which really promote car movement will not run themselves. At first thought we should have assumed that this somewhat novel manifestation of the rate-cutting evil was an inevitable result of the unhealthful atmosphere of Chicago, but it seems that one of the healthiest roads is responsible for it. Probably we must assume that when business is extremely dull the atmosphere is unhealthful for demurrage collectors everywhere. A very few years ago every one would have been surprised to see this movement half as successful as it is. The other Chicago item to which we refer is that about a road voluntarily relinquishing traffic (the Michigan Central). This may not be a great event, but in view of the remarkable timidity that has been manifested by nearly everybody when such a thing was even mentioned, the fact that one road actually "withdraws from the market," even for a brief time, is worthy of note. Our correspondent's statement may be construed as being quite sweeping, but probably it is not to be assumed that the Michigan Central agents go around to their customers' offices introducing Grand Trunk or Baltimore & Ohio solicitors; it is easy enough to reduce tonnage without going to that extent. This withdrawal indicates not merely that the Mechigan Central is "over" its due proportion, but that it is a good deal over; and one naturally wonders whether the large quantities of grain said to have been contracted by this road at less than cost, were included in the tonnage so generously surrendered. If one could only give away that kind of business and keep the rest, life would not be devoid of interest.

The special commission appointed by the Canadian Government last fall to investigate the complaint of the people west of Winnipeg, concerning alleged excessive freight rates on the Canadian Pacific, has made a report, the substance of which is that the rates are neither burdensome nor excessive, and are not higher than those of the Northern Pacific and the Great Northern for goods carried under similar circumstances. The Commissioners, Messrs. P. S. Archibald, William Pearce and W. H. Allison, visited prominent places between Winnipeg and the Rocky Mountains and made an extensive inquiry, and their report is a bulky one. They present comparisons between Canadian Pacific prices and those of roads on this side of the line for grain, cattle and coal. Numerous instances are mentioned where the Canadian rates are lower than those made by the Northern Pacific and others where the Canadian rates are lower than those prescribed by the North Dakota Railroad Commissioners for similar service. Local rates are high, as in all thinly settled countries, but the local traffic is so exceedingly small that the burden upon the people is held to be insignificant. The complainants, as usual, were often unable to produce definite evidence to support their assertions, and there was no complaint from any large freight shipper. Commenting on this report the Montreal *Gazette* says:

The Northwest Freight Rate Commissioners' report shows, so far as the greater part of Manitoba and the territeries is concerned, that the Canadian Pacific rates are lower than those in the adjoining parts of the United States. It was on the strength of assertions that the Canadian rates were higher than those maintained on its southern rivals that the commission was appointed. Other Canadians are only beginning to understand how much windage must be allowed for in connection with Winnipeg's wailing.

Some of our readers will doubtless remember some correspondence and news items that we published late last year concerning the renewal of bridges on the Bombay, Baroda & Central India Railway. The facts are briefly that a Government Inspector reported that a very large number of the bridges on that line were condemned some

time ago as too weak, and he considered that the replacing of those bridges as being unduly delayed. In all there were some 700 spans that needed to be replaced by more robust bridges. The Chairman of the company, General Trevor, was inclined to make light of the criticisms, and the Chief Engineer did not admit that the bridges were unsafe. General Trevor said that they were weak when tested by the new rules of the Public Works Department. Cracks had been discovered in some of the tension members, but he did not believe that there was any more danger of collapse of these bridges than at any time in the last 50 years. The outcome of the matter is that the bridges are being replaced, and in our advertising columns will be found the announcement of some 500 spans of 60 ft. Warren girders for sale. These are through bridge trusses 13 ft. apart, and are now carrying the traffic of the railroad which has 5 ft. 6 in. gage. The present engine loads may be taken at 1.3 tons per ft., which loads the bridges carry safely. Bids for these spans are now sought, and blue-prints may be seen at this office.

There is a bill before the New York Legislature reducing the rate for single fares on the ferry between New York City and Staten Island from 10 cents to 5, and besides the objection of the railroad company which runs the boats, which was to be expected, the bill is objected to from a source somewhat unusual. Controller Fitch, of New York City, writes to the Chairman of the Legislative Committee, saying that the franchises for ferries are sold by the city on the basis of a fixed charge for fare and the proceeds go into the sinking fund. "If such restrictions of the Legislature," he adds, "be lawful and binding upon the parties, the city's financial interest in its ferries may be seriously affected. At this time, when a large increase of the city debt is upon us, the revenue of the sinking fund ought to be most carefully guarded." The Controller also urges against the bill that it is contrary to the principle of home rule. The city, he says, began leasing ferries in 1654, 123 years before the State of New York was established, and its rights should not be interfered with by the Legislature.

The people of Texas think the railroads treat them with a good deal of severity. We are not sure that we always blame them for this feeling, for it often happens that a railroad in a sparsely settled country has to fight with a good deal of selfishness to keep its head above water; but even a Texas railroad sometimes finds it practicable to meet the "needs of the people," and we are glad to be able to congratulate the Texans on an item in a recent Houston paper announcing that the Southern Pacific is going to run an excursion to New Orleans on June 3 in which passengers will be carried at $5 for the round trip. This is at the rate of less than 7 mills a mile.

TRADE CATALOGUES.

Automatic Electric Signaling is the title of a handsome new catalogue (100 pages 8×11 in.) just issued by the Hall Signal Co., of New York City. It is thicker than any of the former catalogues of this company and gives correspondingly more information. It is in the usual elegant style of this company's publications and has a dozen handsome, full-page direct-process reproductions from photographs. The colored plates in the opening pages show eight different cuts of signals, and this does not include the different arrangements of signals on bridges. There are also three styles of highway crossing signals. The descriptions of apparatus seem to be of the same general character as those heretofore published, though the detailed accounts of the different arrangements of circuits have been re-written and amplified. Under the head of track-circuit signaling there are four diagrams showing four different ways of arranging such circuits for signals standing normally at clear, and four for signals standing normally at danger. Diagrams are shown of the Hall signals at Kansas City and other places, and of the eight highway crossing signals in a bunch at Michigan City, Ind. The full-page perspectives show signals on the Boston & Albany, the New York, New Haven & Hartford, the Lehigh Valley, the Delaware, Lackawanna & Western, the Central of New Jersey and the Illinois Central. There are 15 pages of outline drawings illustrating lists of parts which have been arranged and numbered for convenience in ordering.

Elephant Brand Phosphor-Bronze. The Phosphor-Bronze Smelting Co., Limited, 2200 Washington avenue, Philadelphia, Pa. 1895.

This little pamphlet gives some facts concerning the well-known compound, phosphor-bronze, manufactured by the Phosphor-Bronze Smelting Co. The chemical action of phosphorus on the metals composing the alloy reduces any oxides dissolved therein on one hand, and on the other forms with the purified metals a strong, hard, tough, rigid and elastic substance which is not easily corroded. This point of fusion is about that of ordinary gun metal. It loses less in remelting than brass. Alloys may be made as ductile as copper or nearly as hard as steel, being useful for a variety of purposes between these two extremes.

Tests of phosphor-bronze wire No. 1 give 159,515 lbs. per sq. in. tensile strength when hard and 58,853 lbs. when annealed. The ultimate extension in per cent. when annealed is 46.6, while the number of twists in a 5-in. length is 13.3 when hard and 66 when annealed.

Tests to show the durability of phosphor-bronze wire when exposed to the weather were made by comparing it with brass wire, the two being left lying on damp ground for a period of 10 months, at which time the brass was found to be quite brittle and worth less, the phosphor-bronze wire being practically unchanged. The conductivity of this wire is about twice that of iron and steel wire. The metal is used for parts of machinery subject to constant vibration, or general machine casting, for bells, steam whistles, valves, cylinder linings, propeller screws, piston rods, steam cylinders, etc. A very hard and durable alloy is also made for use as an anti-friction metal for bearings.

Around the Lakes.—The Detroit Dry Dock Co., Ship and Engine Builders, Detroit, Mich., 1894.

This carefully prepared and handsome volume of 235 pages is worthy of more than a perfunctory notice. The illustrations are not only attractive but instructive and there is a variety of useful and valuable information contained in the book. The work opens with a list of the American steam and sailing vessels on the great lakes, supplemented by photographs of the officers and managers of the Lake Carriers Association. Records of tests of the steamer "Harvey H. Brown," and a description of the Howden hot draft system follows. After this are given photographs of the company's plant and of a great number of lake vessels while in course of construction, among others, the car ferry steamer "Saint Marie." The history of the work of the company during the past 23 years is interesting, while the statistics of lake commerce, covering 11 pages are valuable. Statistics concerning waterways from the lakes to the sea board complete the volume, which has an excellent index.

Sketches of Wonderland is the title of a handsome pamphlet issued by the General Passenger Agent of the Northern Pacific, describing the scenery reached by his road. Like most other late publications of the kind, it tells its story largely by the pictures, with which the book is filled; though the text has been carefully prepared by Mr. O. D. Wheeler, who ascended Mt. Rainier especially to obtain material for the book. The picture are mostly new and original. Most of them show wild scenery, but others enable the reader to appreciate in some degree the marvelous growth of the cities on the Pacific Coast. The scenery of Mt. Rainier and other mountains is well shown. There is a special map of this mountain and its environs. The Yellowstone Park folder, just issued by the Northern Pacific, contains a large new "bird's eye" diagram of the Park.

The Rusting of Iron and Steel. How it may be prevented and how it is promoted.

Under this title the Prince Manufacturing Co., 71 Maiden Lane, New York, issues a pamphlet designed to promote the use of "Prince Brothers mineral brown," formerly called Prince's metallic paint. This is an iron oxide paint, the ore being converted into peroxide of iron. The catalogue explains the special advantages of this paint and gives many instances of its use and favorable opinions concerning it. This matter is especially interesting just now in view of Mr. Gerber's valuable paper before the American Society of Civil Engineers and the discussion which the paper called out all of which will doubtless soon be published and will make a very valuable monograph on paints for metallic structures. It will be remembered that Mr. Gerber's observations went to show that iron oxide is the best paint for such uses.

Industrial Railways.—Most of our readers are doubtless quite familiar with the ingenious and "mechanical" devices manufactured by the C. W. Hunt Co., 45 Broadway, New York. We have received from this company a recent catalogue devoted particularly to its system of industrial railways. The catalogue shows the standard sectional track which, with switches, frogs and turntables is always kept in stock. It shows also the rolling equipment designed and made for use on this track. It will be remembered that the company uses an outside flange on its wheels, permitting very sharp curves; in fact, the standard curve used has a radius of 12 ft., the gage being 21½ in.

The *Kilmer Manufacturing Co.*, Newburgh, N. Y., has issued a "Special Fencing Circular" in the form of a small 20-page pamphlet, describing and illustrating various designs of lawn, wire, picket and field fencing, and fence posts. Special attention is called to a new form of field fencing suitable for railroad uses.

TECHNICAL.

Manufacturing and Business.

The Illinois Rolling Stock Co., of East St. Louis, has been organized to build freight cars and other rolling stock. The incorporators are: Edward S. Robert, Daniel G. Taylor and Eleneious Smith.

The Clyde Steamship Co. has placed the order for its new pier shed at New York, with the Berlin Iron Bridge Co., of East Berlin, Conn. The building is 344 ft. long and 124 ft. wide, entirely of iron.

Edward J. Eames has become associated with the Revere Rubber Co., of Chelsea, Mass., with office at 150 Lake street, Chicago.

Officers of the National Switch and Signal Co. were elected at Easton, Pa., on May 6, as follows: Oakleigh Thorne, President; Charles Hansel, Vice-President and General Manager; George H. Hansel, Secretary and Treasurer.

The Richardson Lock Nut Co., of Buffalo, secured a charter at Albany, N. Y., last week, to manufacture bolts and lock nuts in Buffalo. The capital is $16,000 and E. H. Bemus and S. C. Entwistle, of Jamestown; Robert Lockhart, of Bethlehem, Pa., and E. J. Smith, George L. Brown, James C. Beecher, and others, of Buffalo are the directors.

Mr. H. T. Bigelow, formerly Western Representative of the Buckeye Malleable Iron & Coupler Co., has been appointed Western Agent for the Hale & Kilburn Manufacturing Co., of Philadelphia, Pa.

A mortgage of $372,000 was filed last week against the property of the Moorhead-McCleane Co., important manufacturers of sheet iron, with mills on Second avenue Pittsburgh. The company is now in the hands of a receiver and the company which holds the mortgage has begun a suit for foreclosure and the date has been set by the court for argument on this petition.

Mr. A. G. Schevers, who was so long associated with the American Brake Co., has now become connected with the McConway & Torley Co., of Pittsburgh, Pa., and he will have his office in Chicago.

The additions to the plant of the Westminster Paper Co., Bellows Falls, Vt., are now completed. The new machine room is 40 ft. wide and 185 ft. in length, covered with the Berlin Iron Bridge Company's patent anti-condensation corrugated steel roofs.

The Kalamazoo Railroad Velocipede & Car Co., of Kalamazoo, Mich,, is just in receipt of an order from Tezpore, Assam, India, for a number of its No. 6 spring seat inspection velocipede cars and No. 4 combination pleasure or mail cars. The company is also receiving a large number of orders from railroad companies in this country for its new patented malleable center hand car wheel, and for hand cars furnished with this new wheel.

The Shickle, Harrison & Howard Co., of St. Louis, has recently purchased the Westlake patents for car bolsters made of steel, and will soon place them on the market. This company has recently received an order from a railroad in the southwest for 2,000 of its improved M. C. B. couplers. The company also manufactures a cast steel truck, and Mr. J. W. Duntley, who has recently become traveling agent of the company, will have special charge of the sale of this truck, his office being in the Monadnock Block, Chicago.

The National Tube Works, at McKeesport, Pa., advanced the wages of about 600 of its employees 10 per cent. on Monday of this week. The officers state that this advance in wages is not warranted by any improvement in the margin of profit or manufactures, but it has seemed advisable because so many other manufacturers of iron and steel in the same district have recently advanced wages. Present orders will keep the company's plant working steadily for some time, and it is expected that the works will be able to run throughout the summer, except for one week in July, when the works will be closed as usual. The company looks for a considerable advance in the price of its manufactured goods by June 1.

The Standard Electric Co., whose chief office and present works are in Chicago, has recently increased its capital stock half a million dollars to $1,500,000. A new element has been introduced in the management, and Mr. A. G. Spaulding, a well-known business man of Chicago, becomes President. Mr. E. E. Crepin will continue as Treasurer of the company, and Mr. D. P. Perry, General Manager. The Board of Directors, besides these officers, includes Gilbert B. Shaw, President of the American Trust & Savings Bank, of Chicago; Mr. J. P. Whitney, of Philadelphia, and Mr. G. A. Rollins, all well-known financial men. The company has planned to greatly enlarge its business and is now considering a lease of one of the largest factories in the West, which will be equipped with new machinery of the most modern type. The Standard Electric Co. will be remembered as the company which announced itself as prepared to light the World's Fair grounds in 1893 at a materially lower rate than had been accepted by the World's Fair managers on bids submitted by the larger electric manufacturing companies. The bid of the Standard Company finally resulted in the Exposition officials securing the 4,000 arc lamps for lighting the grounds at a sum about one-half less than that originally called for. The Standard Company installed in Machinery Hall, a service plant which supplied 25,500,000 arc lamps without losing an armature or even an armature coil.

Iron and Steel.

The Toledo Electric Railway Co., has placed an order with the Cambria Iron Co., Johnstown, Pa., for 6,000 tons of street rails, to be delivered within the next few months.

The International Forging Co., of New York City has recently been organized to engage in electric welding. Manufacturers James Seager and J. L. Ullo, of Brooklyn, are Directors.

The Reading Iron Co. is to erect two new rolling mill buildings, each 100 x 200 ft., in Reading, Pa., the buildings to be completed in four months. The iron work for the buildings will be furnished by the Phœnix Iron Co.

The receivers for the Otis Steel Co., which has its chief offices at Cleveland, O., were appointed last week in the Court of Common Pleas at Cleveland. The application was made by the counsel for the English bondholders, and Albert Carl and Prestwood J. Benbow were named as receivers, and gave bonds for the sum of $50,000. It is understood that the English stockholders, who have controlling interest, have decided to wind up the business of the present company and to reorganize, forming

a new corporation and supplying new capital. A receiver for the property has already been appointed in the English courts. The receivership will not affect the manufacturing department of the company, the business being continued without interruption under the direction of the court.

The Q. & C. Co., manufacturer of the Servis tie plate is now arranging with the Illinois Steel Co. to have the manufacture of its tie plates undertaken at the works of the steel company at Bay View, Milwaukee, Wis. Recently the Q. & C. Co. made a somewhat similar arrangement with the Pennsylvania Steel Co., by which Servis tie plates will hereafter be made at the works of that company at Steelton, Pa. An order for half a million tie plates has just been given to the Pennsylvania Steel Co., under this agreement. The necessity for having a plant for the manufacture of the tie plates to supply the demand for them from the western railroads led to the agreement now about closed with the Illinois Steel Co, by which the plates are to be made at the Milwaukee works. The Q. & C. Co. reports that at present it has orders on its books for over a million of these tie plates.

New Stations and Shops.

The Western Maryland Railroad has been offered a free site at Williamsport, Md., as a location for the roundhouse and freight yards now at Hagerstown, Md. This offer has not yet been accepted by the company, and it is stated that the question as to the removal of the freight terminals from Hagerstown will not be decided until certain surveys now being made to estimate the cost of reducing grades near Hagerstown have been completed.

The H. C. Frick Coke Co. is to erect a new shop opposite Scottdale, Pa., on a tract of six acres of land just purchased. J. P. K. Miller, Chief Engineer of the company, is now preparing the plans of the building, which will be an iron and steel structure and will cost probably $50,000. The shops will contain new and improved machinery and will employ about 100 men. The construction of new cars for the company will be undertaken at these shops, as well as the repairs of old cars, pumps and machinery for the coke plants owned or controlled by the Frick Company.

The New York & New England Railroad is about to build a large two-story warehouse in Boston to provide better facilities for landing and storing freight. The building will be 480 ft. long and 60 ft. wide and will be of composite structure, with steel framework and wooden sheathing. It will be located at the outer end of pier 4, upon the company's Boston terminal ground, which is just northeast of Congress and B streets, South Boston. The upper floor has been designed to carry a load of 250 lbs. to the square foot. The lower floor will have tracks laid on it, so that cars may be run into the building. The water depth is such that ocean steamers may lie alongside the dock and discharge freight. The contract for the steel work has been let and it is expected that the structure will be completed by September next.

It is rumored at Raleigh, N. C., that the machine shops of the Seaboard Air Line, now located there, are to be removed to Portsmouth, Va. The car shops, and all wood-working shops of the road were removed from Raleigh to Portsmouth several months ago. The machine shops at Raleigh are the principal ones of the Seaboard Air Line, and employ several hundred men. A correspondent at Raleigh states that the Seaboard Air Line officers decline to either affirm or deny these reports.

Roofing for Train Sheds and Roundhouses.

Some of the qualities most desirable in a material for roofing train sheds, roundhouses, freight cars, etc., are that it shall be unaffected by changes of temperature, shall remain elastic, shall be water, acid and alkali-proof, and shall not require coating after application. These qualities, it is claimed, are combined in a roofing material made by the Standard Paint Co., called their P. & B. Ruberoid roofing. It is made of wool-felt impregnated with a water and acid-proof composition, is easily laid, contains no tar and is odorless. The quality made for car roofing is lighter than the usual type, and is sold in rolls sufficient for roofing one 38-ft. car. The company guarantees this roofing to last the life of a car if applied according to directions. It further offers to send a sample car roof free to anyone doubting its efficiency.

The P. & B. insulating papers, which have been extensively used for many years for insulating refrigerator cars, are also made by this company. Being waterproof, odorless and air-tight, they give practically perfect insulation. A large quantity of this paper has recently been ordered for lining 700 Southern Pacific fruit cars, this order, together with one other, aggregating over 1,000,000 ft. of paper.

Seventy-five Cars Air-Braked.

We noted last week the run on the Northern Central Railroad of an air-braked train of 75 cars. We now have a few additional particulars. This was an experiment to see upon how many cars the air-brake could be worked satisfactorily, and a good opportunity was afforded by a train of 75 cars drawn by a class "R" locomotive between Sunbury and Harrisburg. The trip of 53 miles was made in about five hours, including stops and time consumed in reducing speed. From 6 to 11 lbs. of air was required for the full stops and about 5 lbs. in reducing speed. The train line pressure was about 65 lbs., and there were no shocks on the rear cars when brakes were applied. The trial certainly demonstrates that any trains that are likely to be run in ordinary service are well within the capacity of the Westinghouse brake. This train was the longest ever run on the Pennsylvania Railroad lines entirely equipped with air-brakes, and possibly the longest ever run anywhere.

The National Switch & Signal Co.

The National Switch & Signal Company is to furnish a large interlocking machine for New Rochelle, on the New York, New Haven & Hartford Railroad. This is the junction of the four-track main line, with the two-track Harlem River branch, and the tracks are laid with 100-lb. rails, and as there are two slip switches in the plan, a 48-lever machine was necessary. The work to be performed by this machine will be severe. The National Switch & Signal Company has recently ordered for its shops considerable machinery to meet the requirements of the increasing business. The annual meeting of the company was held on May 6, at which time the old officers were re-elected.

The Richmond Compound on the Pennsylvania.

The Richmond compound mentioned in our issue of April 26, page 272, as having gone to the Pennsylvania for trail, is running in freight service between Harrisburgh and Tyrone. The loads are said to be 85 empty cars west and 65 loads east.

New Steamship for the Plant Line.

The Newport News Shipbuilding Dry-Dock Company has been awarded the contract for building a vessel finer than any heretofore constructed at the yards. It is for the Plant Investment Co., and will cost $600,000. The vessel is to be 400 ft. long, 47 ft. beam, 37 ft. 6 in. deep and 5,000 tons register. Her twin screws will be driven by quadruple expansion engines and she will have a total horse-power of 7,000. She will have accommodations for 700 passengers. Her interior will be finished in mahogany. The vessel is to be completed in nine months.

A Car Gas Explosion.

A little flurry was made the other day by what the newspapers describe as an explosion of a gas tank under the Pullman car "Tagus" in the Pennsylvania station at Jersey City. The Pennsylvania uses compressed city gas, the compression being from 16 to 20 atmospheres. It is not customary, we believe, at this season, the evenings being rather short, to charge at above 18 atmospheres. So far as we can learn, the particulars of the explosion in question were about as follows: The car was being gassed in the station and the trouble was caused by the bursting of the hose. Of course, by its breaking, the gas that was already in the tanks could escape as well as that issuing from the piece of hose attached to the pipe line. Some of the escaping gas got under the station platform, and after this some of that escaping from the hose was lighted by a lantern, and the fire following caused the more or less confined gas under the platform to explode, and this explosion caused some damage to the windows of several cars. There was no explosion of the gas tank on the car, and there was very little burning or other damage except the breaking of the windows. A new train was made up, and went out three minutes late.

THE SCRAP HEAP.

Notes.

The Illinois Legislature has rejected the bill making train robbing a capital offense. It was argued that the measure was too sweeping, allowing a severe penalty for a simple assault upon a trainman.

A severe rainstorm in the region of Nacogdoches, Tex., May 4, 5 and 6 carried away a large number of bridges. The Houston, East & West Texas Railroad was washed out at many places, and the San Antonio & Aransas Pass suffered in a like manner.

The Postmaster-General has decided to establish a marine postal service at Detroit, for the free delivery and collection of mail matter of the vessels that pass up and down the Detroit River, without touching at Detroit, and carry a floating population of 2,500 to 3,000 persons.

The bridge over the Philadelphia & Reading Railroad at Walnut street, Reading, Pa., was badly damaged on May 6 by being struck by a steam shovel on a platform car which was passing beneath the bridge. A 12-in. water main was broken. It was believed that the bridge would have to be rebuilt.

The Pennsylvania Railroad is evidently keeping a sharp eye upon electric car competition at all points. At Greensburgh, Pa., it has asked for an injunction against an electric line which proposes to lay tracks on an overhead bridge across the Pennsylvania tracks, alleging that the structure is not strong enough to carry the cars.

It is reported that E. H. Goodman, General Manager of the Union Switch & Signal Company, has patented a signal in which the semaphore blade is fitted with two rows of electric lamps arranged in separate circuits and having different colored globes. The lamps are thrown into and out of circuit by the movement of the blade, displaying different colors according to the position of the blade.

The Missouri Pacific has decided to put on an additional passenger train from Kansas City to St. Louis, leaving the former city at 1:15 p. m., and making convenient connection with the new eastbound fast mail train of the Baltimore & Ohio Southwestern, thereby shortening the time between Kansas City and New York 12 hours. The Business Men's League of St. Louis has passed a formal resolution of thanks to the officers of the Missouri Pacific, the Passenger Transportation Committee of the League having been active in promoting the demand for the train.

Railroad Bridges Destroyed in Cuba.

A press dispatch of May 10 from Havana says that the insurgents have destroyed all the railroad bridges between Cristo and San Luis.

Clocks on Locomotives.

The Paris-Lyons-Mediterranean Railroad Company has recently put clocks on the outside of its locomotives on the side toward the station platforms, in order that passengers can observe the time and that the station agents can more conveniently note the instant of arrival and departure. It is said that in spite of the great motion, or as the French editor expresses it "la trépidation énorme," especially on fast trains, the clocks show no variation.

Entertainment Expenses at the Railroad Conventions.

The New York Railroad Club, at its meeting on April 18, adopted a resolution instructing the chairman to appoint a committee and inviting the New England, the Central, the Western, and the Southern and Southwestern railroad clubs to appoint similar committees to meet at Alexandria Bay during the conventions and "to devise the best means of arranging for such subscriptions and entertainments." The entertainments referred to are those which have long been provided by the supply men at these conventions, the subscription being that which has been levied for many years upon the supply men. We question very much if the railroad clubs will consent to provide in this way for the entertainment of such of their members and other railroad men as may attend the conventions, although it would certainly be a more dignified plan than the one which has heretofore prevailed.

Low Water at the "Soo."

Because of the decrease in the stage of water at St. Mary's Falls Canal, at the outlet of Lake Superior, which is now about a foot lower than usual, vessel men are of the opinion that freights should advance. An inch of draft means not far from 25 tons difference in the capacity of the larger lake vessels, so that every one of the Lake Superior fleet is handicapped about 300 tons by the lower water. As about 50 big freighters will pass the canal daily, there is a decrease in capacity of 15,000 tons daily, after the season is fully under way. In the season, if the low water should continue, which is not likely, there will be a difference of 3,000,000 tons, quite a notable difference, and one which should cause an increase of rates.

Lake Notes.

One of the two Standard Oil Co. barges, to carry 408,000 gallons of oil in tanks, built to the order of that company at Superior, Wis., has been launched. This is the first of a line of boats to carry the products of the Standard Co. from Whiting, the Lake Erie distributing station, to the upper lakes, from whence distribution to the northwest will be made. The company will have its chief distributing station for the northwest at the head of Lake Superior and is to put up two 30,000-bbl. tanks there, in addition to the capacity it now has.

A dock 2,000 ft. long is to be built for the Chicago, St. Paul, Minneapolis & Omaha at the head of Lake Superior, doubling its flour and merchandise capacity. Winston Bros. have begun work on the structure.

The Wheeler Shipbuilding Co., of West Bay City, has a contract for a 5,000-ton steel ship for the Eddys, of Detroit. The boat will be 391 ft. over all, 45 ft. beam and 27 ft. deep. It will be ready in the spring of 1896.

The Cleveland & Buffalo Transit Co. will have built by the Detroit Dry Dock Co. a steel side-wheel ship for the passenger service between the cities mentioned, to cost $375,000 and to be 308 ft. long. The hull will be of open hearth steel. The vessel will have sleeping accommodations for 600 people.

New York Air-Brake Company.

Mr. Royal C. Vilas, President of the New York Air-Brake Company, has offered his resignation and has placed an attachment on the company's property for a claim amounting to $13,409, balance due for services rendered. Mr. Vilas has long been known as a railroad officer and was for many years in the service of the Erie Railway. For a long time there have been internal dissensions in the New York Air-Brake Company as the result of management which did not meet with Mr. Vilas' views. He has, therefore, severed his connection with them. The late decisions in the courts, which have been unfavorable to this company, and in which the Westinghouse Air-Brake Company has been plaintiff, have done a good deal to bring about a state of affairs that has caused the attachment to be placed as noted above.

An Avalanche in Pennsylvania.

Near Huntingdon, Pa., on Saturday last there was a tremendous landslide which covered the tracks of the Pennsylvania Railroad to such an extent that it took 800 men 24 hours to reopen communication. A press dispatch of Sunday gives particulars of the occurrence as follows: An army of nearly 1,000 men have toiled an entire day to remove the great landslide from the Pennsylvania Railroad tracks at Jack's Narrows. Both tracks were reopened for business at 3 o'clock this afternoon, and the 15 miles of solid trains that had been halted on either side of the obstruction began to move East and West. The landslide occurred in the historic Jack's Narrows, a defile between Terrace and Jack's Mountains. The railroad tracks lie at the base of Terrace Mountain, and about 30 ft. above the Juniata River. At 2:30 o'clock yesterday afternoon two opposing storm clouds of immense proportions met just over Terrace Mountain and a waterspout was formed which washed great gullies down the slope, tearing out large rocks and full-grown trees.

Soon after the cloud burst, the north side of the mountain suddenly gave way, from the base to the top, and extending for a distance of nearly a mile along the railroad tracks. An eastbound freight train, that was passing at the time, was caught up in the landslide and carried from the rails. The 17 cars and the tender of the engine were buried under 20 ft. of debris, but the engineer and fireman escaped injuries. Over 500 tons of coal and coke were carried with the cars into the river.

The line of telegraph poles standing on the north side of the tracks at the foot of the mountain were transferred by the landslide 60 ft. to the opposite side of the roadbed and still remained standing. Rocks, which it required a derrick to remove, were cast upon the tracks. This debris in places reached a height of 50 ft. above the

tracks. In digging out the roadway and the buried cars that were not carried into the river, the wreckers used shovels principally, though large derricks were brought into play in dislodging the big boulders and trees. Great stretches of the rails and roadbed were forced 50 ft. aside.

Through trains were taken around by way of Lewistown and Sunbury.

Lining the Stampede Tunnel with Brick.

The Northern Pacific has just awarded a contract to a Tacoma firm for all the brick which will be needed this year in carrying on the relining of the Stampede Tunnel in the Cascade Mountains. The contract will call for about 2,200,000 brick, and the price at which they are supplied is understood to be much lower than that secured in any previous year. The work of replacing the original timber supports in the tunnel with brickwork has been going on now for about six years, and when the brick called for in the present contract has been put in place more than 12,000,000 brick will have been supplied for this work. The Union Brick Works has secured the contract for the brick work for each year, although it is stated that the competition this year was particularly active and close.

The Metropolitan Elevated, Chicago.

The Metropolitan Elevated road began running its regular trains on Monday morning, May 6. The whole road is not yet opened, but only the northwest division as far as Robey street, the down-town terminal being at Canal street on the west side of the river. This will be the terminal until the bridge is completed. The first train was started from the west terminal at Robey street at 6 a. m., and the trains were run at intervals of six minutes. They were made up of a motor car and two trailers, the motor car being used as a smoker. The six-minute interval was kept up till 6:30 p. m., after which the night trains were run every 20 minutes. Everything incidental to the opening of the road went off smoothly there being only one slight delay occasioned by the breaking of a trolley shoe. The interlocking, installed by the National Switch & Signal Co. aided materially in the promptness with which the trains were handled, Mr. H. M. Sperry taking personal charge of the operation of the signals. No figures could be obtained as to the traffic, but from observation it seems to be very good. No turnstiles or tickets were used, the passengers paying to the gatemen who rang up the fares on indicators. It will probably be two weeks or more before the bridge is completed, and the regular down-town terminal open. No announcement of the fact that the road was to be opened was officially made, because it was not desired to have a rush on the first day

Lake Superior Iron Ore.

Shipments have started very briskly at all upper lake ports. In the first week of navigation Ashland sent forward 70,000 tons; Duluth and Two Harbors, 86,800 tons. Over 8,000 tons are going over the Duluth & Iron Range road from the Vermilion range, and half as much more from the Mesaba, while the Duluth, Missabe & Northern is handling about 7,000 tons a day. The Duluth & Winnipeg will commence its ore traffic about June 15. At Ishpeming and Negaunee the Duluth, South Shore & Atlantic has 10 switching crews at work, and will put nine more on soon. Shipments by this road to Marquette will be larger than last year, when about 1,100,000 tons were handled. The Chicago & Northwestern has three switching crews at Ishpeming, and will carry more ore from the Marquette range than last year, as well as increase its Menominee range traffic.

An advance in wages has been made by all the companies in the Minnesota Iron Co., employing 2,400 men, the last to advance being the Chandler, which has raised wages from 10 to 18 per cent.

Stocks of iron ore on Lake Erie docks are but little over the total at this time in 1894, being as follows for several years back:

Year.	
1891	2,062,223
1892	1,573,188
1893	2,495,797
1894	2,588,370
1895	2,612,980

LOCOMOTIVE BUILDING.

The Government Railroads of Chili are to build about eight new locomotives and bids for the construction of these engines have recently been invited in the United States and also in Europe.

The Balwin Locomotive Works have received an order from the Buffalo & Susquehanna for two consolidation freight locomotives with 20 × 24 cylinders, weighing in working order about 136,000 lbs. These locomotives are to have the following special features of construction: Westinghouse automatic brake with 9½ in. pump, American steam driver brake, Jerome metallic packing, leach sand blast, coal muffled safety valves, Asbestos cement lagging, Janney coupler, tenders of 4,000 gals. capacity. They will be delivered in June.

The Rhode Island Locomotive Works have recently completed a compound for the Mexican Central, as mentioned last week; also a single expansion engine for the Mexico, Cuernavaca & Pacific Railway, both from the drawings of Mr. Johnstone.

The Dickson Manufacturing Co., of Scranton, Pa., are now building three passenger engines for the Delaware, Lackawanna & Western Railroad, which will be completed early in June. The engines will have boilers of unusual size for the type with a working steam pressure of 180 lbs. The cylinders will be 19 × 24 in. and the driving wheels are 5½ ft. in diameter.

CAR BUILDING.

The Memphis Car and Foundry Co. has lately contracted with the Davenport Syrup Refining Co. for the construction of a number of model tank cars. These cars are built to carry 60,000 lbs. of syrup or molasses, and are modern cars in every respect.

The Missouri Car & Foundry Co., of St. Louis, has received an order from the Dold Packing Co. for 100 cars.

The Live Poultry Transportation Co., which has offices in the Rookery Building, Chicago, will soon give out orders for building about 50 poultry cars. The company already has in service about 150 cars of this type.

The George Fowler's Sons Co., which has its headquarters at Kansas City, contemplates ordering 50 additional freight cars for its line.

The Fall Brook Coal Co. is reported to be prepared to give out contracts for about 200 coal cars.

The Texas & Pacific is asking for bids for 300 freight cars.

BRIDGE BUILDING.

Cincinnati, O.—The Cleveland, Cincinnati, Chicago & St. Louis will build five plate girder bridges from 20 ft. to 95 ft. in length. They are to replace older structures.

Cleveland, O.—The Cleveland, Akron & Columbus has closed a contract with the Youngstown Bridge Co. to build three steel bridges to replace three of the longest wooden bridges on the road, at Brink Haven, Gambier, and Big Walnut.

Corning, N. Y.—Officers of the Delaware, Lackawanna & Western were here May 8 in consultation with city officials regarding the scheme of building a bridge across the Chemung River, probably on Pine street. It is proposed that the city stand half of the cost and the railroad company the other half.

Easton, Pa.—The County Commissioners have awarded the contract for an addition to the Saucon creek bridge in Lower Saucon township to W. H. Reinsmith, of Allentown, at his bid of $1,021.

Long Island City, N. Y.—Governor Morton has approved the bill providing for the construction of a bridge over Newtown Creek, between Brooklyn and Long Island City.

Lowell, Mich.—The contract for the new bridge over the Grand River at Lowell has been awarded to the Canton Bridge Co., of Canton, O., for $1,750, to be open for travel July 20.

Lurich, Va.—Superintendent Kipply, of the Norfolk & Western Railroad, has submitted to a committe appointed by the residents of that section, plans for a highway bridge over New River, at Lurich, Va., which will cost $15,000. The bridge is to connect Virginia and West Virginia and is to give to the people of Lurich and surrounding country, access to the Norfolk & Western road, which is now cut off by the river. The counties interested and the Norfolk & Western Railroad are to aid a private corporation, which will own the bridge and collect toll at a rate stipulated by the railroad and counties.

McKeesport, Pa.—Charters were granted at Harrisburg, May 7, to these local bridge companies: McKeesport Bridge Co., capital $1,000; Directors, A. H. Clarke and A. M. Thompson, New Brighton, and A. P. Kirtland, Pittsburgh. Mifflin Bridge Co., capital $5,000; Directors, Richard G. Wood and Thomas A. Noble, Allegheny; Samuel J. McFarren, L. G. Woods and E. F. Hays, Pittsburgh. Both bridges are to span the Monongahela at McKeesport, the former at the foot of Market street and the latter at Third avenue.

Norristown, Pa.—The jury appointed by the county court to determine the needs of a county bridge at Airy street have reported in favor of such a structure and estimate the cost at $40,000. The jury further recommends that said bridge be built of steel and be 40 ft. in width and contain three main spans, 145 ft., 133 ft. and 190 ft. respectively in length, with the necessary approaches.

The County Commissioners of Montgomery County have advertised for proposals for the iron work and masonry of five bridges to be erected in that county in the near future. The bridges will be located as follows: Over the Perkiomen creek at Schwenksville; over Park creek, Horsham township; over Swamp creek, New Hanover township; over the Wissahickon creek, Whitemarsh township, and over the west branch of Perkiomen creek, Douglass township.

Paterson, N. J.—The Berlin Iron Bridge Co. has just completed a large number of connecting bridges between the buildings of the Barbour Flax Spinning Co., Paterson, N. J.

Sharpsburg, Pa.—At its meeting May 5 the Sharpsburg & Lawrenceville Bridge Co. decided to increase its capital stock from $80,000 to $200,000, and to erect a new bridge to replace the present one crossing the Allegheny River, from Forty-fifth street to Sharpsburg. The new bridge will be a four-track affair, 2,000 ft. long and 40 ft. wide, and will cross the Allegheny Valley and the Pittsburgh & Western tracks 20 ft. above grade. George A. Chalfant was re-elected President.

Wellsboro, Pa.—Bids were opened last week by the County Commissioners for the county bridges at Mansfield and Canoe Camp. Nelson & Buchanan, of Chambersburg, were the lowest bidders. Their bid for the two was $3 396.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Chicago & Western Indiana, special, 1½ per cent.

Delaware & Bound Brook, quarterly, 2 per cent., payable May 20.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Burlington, Cedar Rapids & Northern, annual, Cedar Rapids, Ia., May 28.

Chicago & Northwestern, annual, Chicago, June 6.

Chicago, St. Paul, Minneapolis & Omaha, annual, company's office in Hudson, Wis., June 8.

Manchester & Lawrence, annual, Manchester, N. H., May 31.

Missouri Pacific, special, at St. Louis, Wednesday, June 12. To act upon a proposed issue of bonds to replace the floating indebtedness.

New York & Harlem, 65th annual, Grand Central Station, New York, May 21.

Northern, annual, Phenix Hall, Concord, N. H., on Thursday, May 30.

Omaha & St. Louis, annual, Stanberry, Mo., May 21.

St. Louis, Iron Mountain & Southern, at St. Louis, Wednesday, June 12. The meeting is for the purpose of acting upon a proposed issue of bonds to replace the floating indebtedness.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *American Society of Mechanical Engineers* will hold its annual meeting at Detroit, Mich., June 25, 26, 27, 28.

The *American Railway Accounting Officers* will hold its seventh annual meeting at Detroit, Mich., commencing Monday, May 29, at 10 o'clock a. m.

The *National Association of Local Freight Agents* will meet in New York City at the Broadway Central Hotel on June 11.

The *Master Car Builders' Association* will hold its annual convention at Thousand Islands, Alexandria Bay, N. Y., commencing June 11.

The *Master Mechanics' Association* will hold its convention at the same place, commencing June 17. Applications for rooms for both conventions should be made to J. B. Wistar and Charles W. Crossman, both at Thousand Islands, Alexandria Bay, N. Y.

The *International Railway Congress* will meet at the Imperial Institute, London, England, beginning June 26.

The *American Society of Civil Engineers* will hold its annual convention at Nantasket Beach, commencing June 18.

The *Western Railway Club* meets in Chicago on the third Tuesday of each month, at 2 p. m.

The *New York Railroad Club* meets at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, on the third Thursday in each month, at 8 p. m.

The *New England Railroad Club* meets at Westevan Hall, Bromfield street, Boston, Mass., on the second Wednesday of each month.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, N. Y., on the fourth Wednesday of January, March, April, September and October, at 10 a. m.

The *Southern and Southwestern Railway Club* meets at the Kimball House, Atlanta, Ga., on the third Thursday in January, April, August and November.

The *Northwestern Railroad Club* meets at the Ryan Hotel, St. Paul, on the second Tuesday of each month, at 8 p. m.

The *Northwestern Track and Bridge Association* meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.

The *American Society of Civil Engineers* meets at the House of the Society, 127 East Twenty-third street New York, on the first and third Wednesdays in each month, at 8 p. m.

The *Western Society of Engineers* meets on the first Tuesday in each month, at 8 p. m. The headquarters of the society are at 1736-1739 Monadnock Block, Chicago. The business meetings are held on the first Wednesday at its rooms. The meetings for the reading and discussion of papers are held on the third Wednesday at the Armour Institute, Thirty-third street and Armour avenue.

The *Engineers' Club of Philadelphia* meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m.

The *Boston Society of Civil Engineers* meets at Wesleyan Hall, 36 Bromfield street, Boston, on the third Wednesday in each month, at 7.30 p. m.

The *Engineers' Club of St. Louis* meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

The *Engineering Association of the South* meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at The Cumberland Publishing House, Nashville, Tenn.

The *Engineers' Society of Western Pennsylvania* meets in the Carnegie Library Building, Allegheny, Pa., on the third Tuesday in each month, at 7.30 p. m.

The *Technical Society of the Pacific Coast* meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The *Association of Engineers of Virginia* holds informal meetings on the third Wednesday of each month, from September to May, inclusive, at 710 Terry Building, Roanoke, at 8 p. m.

The *Denver Society of Civil Engineers* meets at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesdays of each month except during July, August and December, when they are held on the second Tuesday only.

The *Montana Society of Civil Engineers* meets at Helena, Mont., on the third Saturday in each month, at 7.30 p. m.

The *Engineers' Club of Minneapolis* meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

The *Canadian Society of Civil Engineers* meets at its rooms, 112 Marsfield street, Montreal, P. Q., every alternate Thursday, at 8 p. m.

The *Civil Engineers' Club of Cleveland* meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The *Engineers' Club of Cincinnati* meets at the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati, O., on the third Thursday in each month, at 7.30 p. m. Address P. O. Box 333.

The *Engineers' and Architects' Club of Louisville* meets in the Norton Building, Fourth avenue and Jefferson street, on the second Thursday each month at 8 p. m.

The *Western Foundrymen's Association* meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. B. W. Gardner, Monadnock Block, Chicago, is secretary of the association.

The *Association of Civil Engineers of Cornell University* meets on Friday of each week at 2:30 p. m., from October to May, inclusive, at its association rooms in Lincoln Hall, Ithaca, N. Y.

National Association of Railway Surgeons.

This association held its eighth annual meeting in Chicago on May 1. The election of officers for the ensuing year resulted as follows: President, Dr. J. B. Murphy, of Chicago; Secretary, Dr. R. E. Welsh, Grand Rapids, Mich.; Treasurer, Dr. E. R. Lewis, Kansas City, Mo. The next convention will be held in Cincinnati.

Canadian Society of Civil Engineers.

At the meeting on May 9, a paper on "Special Trackwork for Electric Street Railway," especially referring to the Montreal and Toronto roads, was read by Mr. E. A. Stone, A. M., Can. Soc. C. E. There was a discussion on Mr. Thompson's paper on "A Micrometer Attachment," and on Mr. Chipman's paper on "The Barrie Flood of 1890."

New York Railroad Club.

At the May meeting of the New York Railroad Club, the last before the adjournment for the summer, there was a discussion on several topical questions. Mr. A. E. Mitchell, Superintendent of Motive Power of the New York, Lake Erie & Western, opened the first discussion, speaking on the tool equipment of locomotives, which had been the subject of an interesting discussion at a previous meeting of the club. Mr. S. Higgins, Superintendent of Motive Power of the Lehigh Valley, spoke on the question: What is the best way to inspect steel tired wheels under passenger cars during the time allowed at stations?

Western Society of Engineers.

A meeting of the Western Society of Engineers was held at Science Hall, Armour Institute, Thirty-third street and Armour avenue, Chicago, Tuesday, May 14. The date of the meeting was changed from Wednesday to Tuesday night by a vote of the society. This was done at the request of the Armour Institute authorities. The paper presented that evening was by Mr. Daniel W. Mead on "The DeKalb (Ill.) Municipal Electrical Pumping Plant," and was illustrated by lantern views

The Committee on Excursions and Entertainments has arranged for an excursion over the Metropolitan West Side Elevated Railroad, on Saturday afternoon, May 18. The rolling lift bridge will be first inspected, after which a special train will leave the terminal station on Franklin street to take the party over the line. The power house will be also inspected.

The Civil Engineers' Society of St. Paul.

A regular meeting of the Civil Engineers' Society of St. Paul was held May 6 at 8:15 p. m., 15 members and 5 visitors in attendance, President Stevens presiding. A circular letter from the Board of Directors of the Western Society of Engineers, relating to the prospective cost of publication of the *Journal* of the Association, was referred to Re resentative Woodman, with power to act. As a matter of suggestion, votes were taken to determine the sense of the meeting on two points only, with the following result: 1. Should it become necessary to discontinue any one department of the *Journal*, the "Proceedings" should be dropped. 2. The "Index to Current Literature" should remain a feature of the *Journal* at all events. The report of the committee on standard wire gages indorsing that of the American Society of Mechanical Engineers was read and accepted. Mr. S. D. Estabrook then read a description of the new steam plant at the Washburn Flour Mills in Minneapolis, and Mr. Wm. A. Pike described a test of its main feature—the Uchican engine.

American Society of Civil Engineers.

On the evening of May 15th, 1895, William R. Hill, M. Am. Soc. C. E., presented his paper on "The Water-Works of Syracuse, N. Y."

As announced in the last "Bulletin" the paper by William Ham. Hall on "The Santa Ana Canal of the Bear Valley Irrigation Company," will again be placed before the society at the meeting of June 5, 1895, for further discussion. The paper is now in the hands of all members in the February number of *Transactions*.

The following information has been received from Thomas Egleston, M. Am. Soc. C. E.:

The Joint Committee of the American Society of Mechanical Engineers and the Master Mechanics' Association on Standard Gages for Thickness, has adopted a gage in the decimal system, a blue-print of which has been received and filed in the library of this society. A committee of the Metrological Society has been appointed with power to correspond with governments and societies abroad, with a view to the adoption of a metric gage. This committee consists of Dr. Thomas Egleston, Chairman; the Presidents of the National Academy of Sciences and of the Metrological Society, the former Director of the Coast Survey in Washington, and the Professor of Physics in Chicago. The last House of Representatives also appointed a special committee to consider the whole question of the adoption of the metric system in the United States.

Th› Railway Signaling Club.

The third regular meeting of the Railway Signaling Club (of Chicago) was held on Thursday, May 7. The report of the committee appointed at the preceding meeting to formulate a code of rules to govern the operation of interlocking plants was presented and discussed. To provide ways and means of publishing the proceedings of the meetings was also the subject of discussion and it was decided that the necessary funds should be raised by assessment.

The report presented by the committee before mentioned contained descriptions of the various forms of signals, and rules referring to their location and meaning. The presentation of a code of rules that could be consistently followed by all roads was the object of the committee, but as the number of roads furnishing rules for the use of the committee was small, the discussion was continued to the next meeting. One point brought out by the discussion was that on some roads, the application of some fundamental rules is impossible. On one road a high semaphore signal with a single blade is used to conduct the movements in both directions over a stretch of track, where considerable switching is done. This is to save the expense of a dwarf signal.

It was recommended by the committee that at junctions two-arm route signals be used, the top arm governing the main line, and the lower arm the branch lines. However, when there is a yard or side connection three arms may be used, the upper one governing the main line, the middle arm the secondary route, and the lower the yard or siding connection.

PERSONAL.

—Mr. Charles W. Cook has just been appointed General Freight Agent of the Cincinnati, Jackson & Mackinaw Railroad. He is at present holding a similar office on the Indiana, Illinois & Iowa Railroad.

—Mr. J. Edward Simmons, who has been Vice-President of the Panama Railroad Company, has been elected President to succeed the late Gen. John Newton. Mr. Simmons is President of the Fourth National Bank of New York, and has been a member of important reorganization committees.

—Mr. J. H. Jones, for nearly 15 years General Superintendent of the Ulster & Delaware Railroad, has resigned to engage in other business, and Mr. Austin E. Benson, Superintendent of Motive Power, has been appointed General Superintendent in Mr. Jones' place. A. W. Belcher was appointed Master Mechanic.

—Mr. Charles E. Walker, Superintendent of Motive Power of the Toledo, St. Louis & Kansas City Railroad, has resigned that position, his resignation taking effect on June 1 next. It is understood that he will go to a southern railroad in a similar capacity. Mr. F. J. Pease, formerly a master mechanic on this railroad, is spoken of as his successor at Toledo.

—Mr. E. Rollins Morse, who has been Chairman of the Finance Committee of the Mexican Central Railroad for some years, has just been elected to the position of Vice-President also. That office was recently held by Mr. S. W Reynolds, who was also Treasurer, and who has recently resigned to accept other service. Mr. Morse is a member of the important banking firm of Lee, Higginson & Co., of Boston.

—The new Texas Railroad Commission will consist of Mr. John H. Reagan, Mr. L. J. Storey and Mr. N. A. Stedman. These nominations were announced by Governor Culbertson, of Texas, last week. The only change in the Commission as it has stood for the last few years is in the appointment of Judge N. A. Stedman, who succeeds Mr. L. M. Foster. Judge Reagan will continue as Chairman of the Commission.

—Mr. Joseph Ramsey, Jr., who is General Manager of the Terminal Railroad Association at St. Louis and who was elected as one of the delegates of the American Rail way Association to attend the International Railway Congress in London in June next, has felt compelled to decline that appointment. Dr. Taussig is now in Europe and Mr. Ramsey thinks that it will be necessary for him to remain in St. Louis and look after the business of the Association.

—Gen. Thomas Lincoln Casey, who has recently been retired as Brigadier-General and Chief of Engineers, U. S. A., was promoted to that office in 1888. He was graduated from West Point in the class of 1852. During his long active service he performed with credit the multitudinous duties of an officer of the Corps of Engineers. In 1877 he was put in charge of the public buildings and grounds at Washington, where he remained until he became Chief of Engineers.

—Mr. Don Alexander has been promoted from the position of Division Freight Agent of the Queen & Crescent to that of Assistant General Freight Agent, with office at Chattanooga, Tenn. Mr. Alexander has been with the Queen & Crescent road for the last four years, going to Chattanooga from Little Rock, where he held a similar position on the St. Louis, Arkansas & Texas. He has written occasionally for the *Railroad Gazette*, but not as often as we would like.

—Vice-President James McCrea, of the Pennsylvania Co., expects soon to sail for Europe, and will attend the International Railway Congress which meets in London in June next. He will be accompanied by Mr. Theodore N. Ely. Several other officers of the Pennsylvania will also attend this Congress, but their names have not yet been announced. Vice-President Frank Thomson, of the Pennsylvania, is now in Europe, and will probably spend the entire summer there. Mr. A. S. Vogt, Mechanical Engineer of the same company, sailed for Europe some days ago, and will also be abroad for about three months.

—Mr. George F. Fay, of Fitchburg, Mass., formerly President of the Vermont & Massachusetts Railroad, died at his home on May 8 last. Mr. Fay was over 70 years of age, and had been out of railroad service for many years. He began as Ticket Agent in 1850, at Fitchburg, for the Vermont & Massachusetts Railroad. He was afterwards at Boston as General Ticket Agent of the Fitchburg Railroad, and later he was President of the Vermont & Massachusetts Railroad until that corporation was merged into the Fitchburg. He had been a member of the State Legislature, and Director in several banks and manufacturing corporations in recent years.

—Col. William Price Craighill, Corps of Engineers, U. S. A., has been promoted to the rank of Brigadier General and Chief of Engineers, to succeed General Thomas Lincoln Casey, retired. General Craighill was born July 1, 1833; therefore, he has but a little over two years to serve before he will be retired for age. He was graduated from West Point in 1852, second in a class including many men who afterward became greatly distinguished in the Civil War. The most famous among these were Generals Sheridan, Schofield and McPherson on the Union side and General Hood of the Confederate Army. He served with credit in the war, and before and after the war did valuable engineering work. He has had actual charge of a good deal of important work in the river and harbor improvements in many parts of the United States. In 1894 he was elected President of the American Society of Civil Engineers and is a member of various scientific and learned societies.

—Mr. Amos R. Barrett, formerly Superintendent of Motive Power of the Boston & Maine Railroad, died at his home in Somerville, Mass., on May 12. Mr. Barrett retired from railroad service last December after an unusually long service with this company. He had been in poor health since 1893 and was compelled at that time by the progress of his disease to give up all railroad work. Mr. Barrett was very well known among railroad men, especially throughout New England. His long connection with the Boston & Maine Railroad and its predecessor, the Eastern Railroad, would alone have made him familiar to those having dealings with Eastern Railroad officers, but he did not need his long service to become widely known, for he was one of those men who easily make a host of friends. He belonged to that old class of mechanical officers who have gained their experience by a long course through the shops. He began as an apprentice in the car shops of the Eastern Railroad when 17 years old, and for 44 years had continued in railroad work, all that time with the Eastern Railroad and the Boston & Maine, except for about three years which he spent in the West. He was promoted steadily, finally becoming Master Mechanic of the railroad, and he held that office for nearly 20 years. In 1882 he went to the Atlantic & Pacific as Master Mechanic, but in 1885 returned east, and became Master Mechanic on the Worcester Division of the Boston & Maine Railroad. In 1891 he was promoted to be Superintendent of Motive Power, and as before stated resigned that office only six months ago.

—Mr. Lewis Kingman has been recently appointed Chief Engineer of the Mexican Central Railroad. Mr. Kingman has for the last six years been City Engineer at Topeka, Kan. His work, however, before accepting that position had been for many years chiefly in the location and construction of railroads in the Western states. He was Assistant Engineer under Mr. A. A. Robinson, Chief Engineer of the Atchison, Topeka & Santa Fe, during the period when that railroad was being extended at such a marvelously rapid rate across Kansas and adjoining states. Mr. Kingman's first service with the Atchison was in 1877 when he was Locating Engineer under Mr. Robinson on the surveys in Colorado and New Mexico, and ater as Locating Engineer on the Atlantic & Pacific. He located most of that line from Albuquerque to the Colorado River, and became Chief Engineer in January, 1882. While holding that office he built over 200 miles of the railroad on the montainous section from Cañon Diable bridge which he constructed to Seal Springs, the section including many bridges and one large tunnel. On this work he had to haul water more than 180 miles for the use of the engines, teams and men, a portion of the time while tracklaying was going on. He sank several wells, some 800 ft., and some 900 ft., without being able to secure water. When this work was finished he was appointed Chief Engineer of the Mexican Central, to build the northern end, by James Nickerson, the President, and Mr. D. B. Robinson, the General Manager, who is now the Vice-President of Atchison, Topeka & Santa Fe. Between April, 1893, and July 1, 1884, he built over 450 miles of the Mexican Central between La Cruz and Calera, turning over the railroad ready for operation, with stations, roundhouses, etc. After completing this work he returned to the Atchison in July, 1884, again as Assistant Engineer under Mr. A. A. Robinson, the present President of the Mexican Central, and laid the track on over 1,390 miles of railroad on lines in Kansas, Indian Territory and Texas. In 1886 he built over 500 miles of road and in 1887 he built 843 miles, and in 1888 40 miles, grading the roadbed, putting down the track and building stations, roundhouses, and completing the railroad ready for operation. In 1889 he became City Engineer at Topeka and has served two terms in that office.

—Mr. Eckley B. Coxe died at his home, in Drifton, Pa., at 10:30 a. m., May 13, of pneumonia. His death removes from active life a very interesting figure. Mr. Coxe had many qualities which made him a prominent and useful citizen, a genial companion and a good friend. His nature was of the large and expansive kind. He looked at life broadly and generously. He was a man of energy and of enthusiasm, fluent in thought and speech, courageous, always ready to talk, and naturally saying some things that he afterward took back; but saying also many wise and lasting things and putting forth a great many stimulating and suggestive ideas. He was rich and, nevertheless, very industrious, and was well educated. Given all of these elements and adding to them a pleasing personality, genial manners and a gift of eloquence and you have a man who is sure to make a mark on his time, and Mr. Coxe became widely known and influential, and was honored by his contemporaries. He was Vice-President of the American Institute of Mining Engineers for 10 years and was President for two years. He was President of the American Society of Mechanical Engineers in the World's Fair year, having also served as Vice-President of that society. In 1880 he was elected to the State Senate of Pennsylvania, but refused to take the prescribed oath that he had not paid out money for election expenses other than those allowed by law, although he insisted that not a cent of his money was spent with his knowledge or consent for improper or fraudulent purposes. The following year he was re-elected with a great majority. He was Chairman of the Pennsylvania delegation to the Democratic convention which first nominated Mr. Cleveland.

Mr. Coxe was born June 4, 1839, in Philadelphia, of an old and wealthy family. He studied in the School of Mines at Paris, also at Freiberg, Saxony, and on his return to his own country he engaged at once in anthracite coal mining in the Lehigh country, becoming one of the firm of Coxe Brothers & Company. All his life Mr. Coxe was interested in scientific and technical matters, and lectured and wrote and invented and promoted investigations in numerous directions, and in 1872 he translated Weisbach's "Mechanics of Engineering and Construction of Machines."

ELECTIONS AND APPOINTMENTS.

Blue Mountain.—At a meeting of the projectors at 926 Walnut street, Philadelphia, the following directors were elected: Oris K. Eldridge, New York; Kensil Wills, Edwin F. Partridge, William E. Camp, William Thompson and William C. Mayne, Philadelphia, and Jacob H. Weible, Strausstown. The Board organized by electing: William Thomson, President; Oris K. Eldridge, Vice-President; Nathan B. Coy, Treasurer; J. F. Brinton, Secretary. The president appointed Walter A. Thatcher Chief Engineer, and William C. Mayne General Counsel.

Central of New Jersey.—The annual meeting of the stockholders was held in New York on Friday, May 10. No change was made in the Board of Directors from last year, and President J. Rogers Maxwell was re-elected President.

Chicago, Burlington & Quincy.—The annual meeting was held at Chicago, on May 8. The old Board of Directors was re-elected. The Board is composed as follows: John M. Forbes, C. J. Paine, William Endicott, Jr., Francis W. Hunnewill, Richard Olney and Geo P. Gardner, of Boston; John N. A. Griswold and James H. Smith, of New York; T. Jefferson Coolidge, of Manchester, Mass.; Edward W. Hooper, of Cambridge, Mass., and Charles E. Perkins, of Burlington, Iowa.

Delaware & Hudson Canal Co.—The annual meeting of the stockholders was held at New York City on May 14. The only business transacted was the election of the following managers: James Roosevelt, Robert M. Olyphant, William H. Tillinghast, Albert Van Santvoord, James A. Roosevelt, Alexander E. Orr, Cornelius Vanderbilt, Chauncey M. Depew, John A. Stewart, James W. Alexander, James R. Taylor, Benjamin Brewster and Horace G. Young. There was no opposition. The entire ticket was elected by a vote of over 200,000 shares of stock. The newly elected managers, who are the same as held office last year, on May 12 re-elected the present officers, namely: President, Robert M. Olyphant; Vice-President, James Roosevelt; Second Vice-President, Horace G. Young; Treasurer, Charles A. Walker; Secretary, F. Murray Olyphant.

Mexican Central.—Charles E. Perkins, President of the Chicago, Burlington & Quincy, and Charles J. Paine, of Boston, a director of the same company, were elected directors of the Mexican Central in Boston last week They take the places on the Board resigned by Messrs Charles A. Brown and F. A. McIntyre, of Boston, who were elected directors at the stockholders' meeting in the same week.

Missouri, Kansas & Eastern.—The annual meeting of stockholders was held last week at St. Louis. The following Board of Directors was elected: Henry C. Rouse, New York; W. Dowd, New York; Edward C. Simmons, Thomas C. Purdy, George D. Dana, Louis B. Tebbetts, C. F. G. Meyer, James B. Case, Eugene F. Williams, David B. Walker, Marcus Bernheime, Ellis Wainwright, Stephen A. Gore, all of St. Louis. The following officers were elected: Henry C. Rouse, Chairman of the Board; E. C. Simmons, President; G. D. Dana, Secretary; Charles G. Hedge, Treasurer.

New York, Susquehanna & Western.—Three new directors of the railroad were elected last week: C. C. Cuyler, of Morgan, Cuyler & Co., H. B. Plant, President of the Plant System, and Thomas H. McIntyre, the member of the Produce Exchange of New York.

William G. McCormick has been appointed Assistant Secretary, with office at 26 Cortlandt street, New York city.

Ohio River.—George Coleman, of Belpre, O., has been appointed General Foreman of the shops at Parkersburg, W. Va. This is a new position created by the new general manager, George Burt.

Pittsburgh, Akron & Western.—The office of Superintendent at Akron, O., recently held by G. F. Gardner, who resigned to accept another office, has been abolished and the duties will hereafter come under the jurisdiction of the General Superintendent, Mr. John H. Sample.

Ravenswood, Spencer & Glenville.—At the annual meeting held at Spencer, W. Va., last Friday, the following directors were elected: William W. Woodyard, John G. Schilling, A. G. Bailey, P. C. Adams, D. W. Chapman, R. T. Wetzel, and J. L. Armstrong. The directors elected W. M. Woodyard, President; J. L. Armstrong, Vice-President; D. W. Chapman, Secretary, and W. M. Trevor, Treasurer. The reports of officers showed that though there had been a falling off in receipts, the road had more than paid fixed charges and expenses, and that arrangements between the company and the Ohio River Railroad, of which it is a branch, had been made for another year which are quite satisfactory.

Southern Pacific.—As announced recently, the Truckee division of this company, extending from Truckee to Carlin, Nev., about 256 miles, has been abolished and the western part of the division added to the Sacramento Division, which makes a division of 190 miles from Sacramento to Wadsworth, under the jurisdiction of J. B. Wright. James Angler, formerly Division Superintendent at Truckee, Cal., has been transferred to the Salt Lake Division, extending to Ogden, with headquarters at Ogden, Utah. He succeeds S. W. Knapp, who has been assigned to other duties. The Nevada or Carlin end of the Truckee Division has been merged into the Ogden Division, which makes it 555 miles long. E. M. Luckett has been appointed Master Mechanic of the entire division between Wadsworth, Nev., and Ogden, and Donald Fitzgerald, Resident Engineer of the Salt Lake Division, has been appointed Assistant Division Superintendent in addition to his duties as Resident Engineer.

RAILROAD CONSTRUCTION,
Incorporations, Surveys, Etc.

Akron & Eastern.—David P. Reighard, of Pittsburgh, who, as recently noted in this column, has purchased a controlling interest in this partly-graded road east of Akron, O., states that the new company which will be organized will probably complete most of the work to Newcastle this season. This will involve the construction of about 60 miles of new railroad. At present the grade has been finished for about 20 miles east of Akron toward Newcastle, having been built in 1893.

Allegheny & South Side.—The application to the Pittsburgh Select Council for authority to build along Bingham street in that city has been rejected. The second branch of the City Council is understood to be favorable to the project, and an effort will again be made to secure the grant of the right of way along the city streets. The company was organized in 1893 to build a short connecting railroad through the city streets along the Allegheny River from the mills of Oliver Brothers & Co. That firm asserts that the road is to be only a private enterprise for their convenience in getting freight in and out of their mills in Pittsburgh. When the application for the right of way was rejected by the Select Council they considered that the line might be used by one of the more important railroads in Pittsburgh.

Benwood & Southern.—Tracklaying on this line has progressed rapidly the past two weeks and the rails are all down from Mannasville to Benwood, W. Va., and it is hoped to have the road in operation 21 miles by July. The company has had heavy work on account of being compelled to practically rebuild the county road for several miles of the way, where their right of way infringed and the space between the road and the river bank was not sufficient for the railroad.

Blue Mountain.—New officers of this company, as given in another column, were elected at a recent meeting of stockholders at 926 Walnut street, Philadelphia. The project is for a line as contemplated by the old South Mountain Company from Hamburg to Harrisburg, Pa. That company abandoned work after a portion of the grading had been done. The location and surveys of the new line have been filed in the office of the Secretary of Internal Affairs, at Harrisburg. As at present surveyed, the line will extend from a point on the Wilmington & Northern and the Schuylkill Valley division of the Pennsylvania, at Reading, on the east, to a point near Harrisburg on the west, connecting with the main line of the Pennsylvania and the Northern Central. An extension of the line from Strausstown to Hamburg as the eastern terminus has also been surveyed. Rights of way have nearly all been adjusted, and some construction work has been done.

Cavarista.—The Cavarista Railway & Investment Co. was incorporated in Colorado last week to build a road from a point on the Union Pacific, Denver & Gulf into the La Belle mining district 48 miles. The incorporators are: President, Thomas F. Dunaway; Vice-President, Frank Williams; Secretary, Herman Brukk; Treasurer, Henry Michelsen. The capital stock of the company is $1,000,000. President Dunaway and Treasurer Michelsen are both connected with the Union Pacific, Denver & Gulf road.

Chicago & Carbondale.—Considerable work has been done on this road south of Johnston City, Ill. It is being built by Johnston Bros. & Faught, of St. Elmo, Ill. They have let the contracts for grading to the following sub-contractors: Brown Bros., Johnston City; F. W. Johnston, Johnston City; S. A. Campbell, Marion, Ill.; C. S. Stocker, Carbondale, Ill.; Welsh Bros., Fredonia, Ill.; Chas. Havens, Carbondale, and C. D. Eby, Cartersville, Ill. The bridging has been let to M. S. Cartter & Co., of St. Louis, Mo. The line is to be built from Johnston City on the Chicago, Paducah & Memphis to Carbondale, connecting with the Chicago & Texas road. The distance is 18 miles. The maximum grades are one per cent., maximum curves three degrees. The construction of the line is under the charge of F. P. Read, of St. Elmo, Ill., Chief Engineer, who had charge of the construction of the Chicago, Paducah & Memphis road.

Chicago, Indiana & Eastern.—The section of this railroad between Fairmount, or rather from Cox's Station, just west of Fairmount, to Matthews, Ind., 20 miles, is now practically completed, the tracklaying having been finished within the last few weeks, and it is the intention of the officers to open it for passenger traffic by May 20. Daily shipments of freight are now being delivered to the Big Four Railroad at Fairmount. The work now in progress is west of the latter town, northeast to Converse on the Panhandle Division of the Pennsylvania. Besides building to Converse it is also intended to extend the line southeast of Matthews to the town of Muncie and also beyond the latter town to Richmond, Ind., but the route beyond Muncie has not yet been decided upon. From Converse to Muncie is 43 miles. The various sections from Converse through Fairmount and Matthews to Muncie pass through the middle of the natural gas belt of Indiana, crossing the most important of the Indiana railroads. The work is being done by a company, of which M. H. Alberger, of Chicago, is the head. Fremont Wilson is Chief Engineer.

Choctaw, Oklahoma & Gulf.—Judge Scott, of the Oklahoma District Court, has dissolved the temporary injunction secured on a petition of the Attorney-General of the United States preventing this railroad from constructing its railroad on the present adopted route. The Attorney-General was induced to ask for this injunction on the petition of residents of Tecumseh, a small town in Oklahoma, which is on the line first surveyed across Oklahoma. When the company adopted the new location it was claimed that its first route having been accepted by the Secretary of the Interior it had no alternative but to proceed with the construction of the railroad on the accepted route. The line now building is a connecting division between the eastern and western sections of the company, which have been in operation for some years. The line is about 125 miles long between Oklahoma City and South McAlester.

Cleveland, Wooster & Muskingum Valley.—The opening of the southern extension to Millersburgh, O., occurred on May 12. This extension is 18 miles long and begins at Wooster, which has been the terminus of this branch since 1893. This makes the total length of the road 36½ miles from Lodi on the main line of the Baltimore & Ohio, crossing Ohio south to Wooster and Millersburgh. Near the latter town the line connects with the Cleveland, Akron & Columbus, and through other directions there is a very direct north and south line to the Ohio River. There are altogether 14 stations on the new line, but only three of them, Lodi, Wooster and Millersburgh, have agents. The road was incorporated by officers connected with the Baltimore & Ohio Railroad and the line has been operated by that company since it was opened for traffic.

Coudersport & Port Allegheny.—George S. Good & Co., of Lock Haven, Pa., have closed a contract to build 23 miles of line from Coudersport, Potter County, Pa., to Ulysses, a terminus of the Fall Brook road in the Tionesta Valley. The work will be started within the next 10 days.

Denison & Northern.—The contract for the Denison & Northern Railroad, from Dougherty, I. T., on the Gulf, Colorado & Sante Fe, to Denison, has been let to McTighe & Co., of Memphis, Tenn., the lowest bidders. Work will begin at once.

Dry Fork.—The railroad, now built for 20 miles in West Virginia, will, it is stated, be extended in the near future to Marlington, in Pocahontas County, and from there to the Chesapeake & Ohio Railroad.

Gloversville & Broadalbin.—The New York State Railroad Commissioners will give a hearing Tuesday, June 4, at Albany, on an application made by the Gloversville & Broadalbin Railroad Company for permission to build its railroad east of Gloversville, to Broadalbin, N. Y., 10 miles.

Guyandotte Valley.—Through the efforts of the Chamber of Commerce, at Huntington, W. Va., a number of New York capitalists have agreed to furnish the money for building a railroad from Huntington, W. Va., up the valley of the Guyandotte river, through Cabell, Lincoln, Logan and Wyoming counties, in West Virginia. A representative made a tour of the region last week, and agreed to furnish the money needed, provided the right of way was secured by the local people interested, and each county made a subscription of $60,000 to the company's capital stock. The proposed road will divide almost in half the section of territory lying between the Chesapeake & Ohio and Norfolk & Western Railroads, and will follow a route surveyed by the Norfolk & Western when the Ohio river division was built a few years ago. It will pass through coal and timber lands.

Hocking Valley & Lake Erie.—This company was incorporated at Columbus, O., with $3,500,000 capital, by O. S. Kelly, of Springfield, O.; Henry C. Ellison, of Cleveland; William F. Kelly, C. L. Kurtz and W. H. Jennings, of Columbus. They will succeed by purchase to the right of way granted by the State two years ago to the Columbus, Hocking Valley & Athens Railway Company along the Hocking Canal for a line from Columbus to Athens.

Indiana Central.—This company has been incorporated with a capital stock of $250,000. It is a revival of the old Toledo, Thorntown & St. Louis Railroad, which was projected to extend between Cleveland and St. Louis.

Mexican International.—Major Killebrew, now the Locating Engineer, is completing the location of the extension of this road from the City of Mexico to the important city of Guadalajara. The route is practically determined upon as far as Nombre de Dios, and Major Killebrew hopes that work may be commenced at once in order to complete this section of the road before the rainy season sets in. This part of the line is very easy of construction and will pass through a fine agricultural valley. The completion of the road to Nombre de Dios would be of great benefit to some active mining camps.

New Roads.—A line is being surveyed for a railroad 20 miles long from a point on the Rio Grande Junction line, 20 miles east of Grande Junction, Col., up the Plateau River to Buzzard Creek in the Plateau Valley, for the purpose of opening up that portion of Mesa County.

Ontario & Rainy River.—The Ontario Government is now considering propositions for aid from this company, which proposes to build to the new gold fields at the Rainy lake. The company wants an outright subsidy of $5,000 a mile or a guaranty of four per cent. on $15,000 a mile of bonds for 20 years. It has been rumored that the government has granted the first proposition for a distance of 80 miles, which will take the road to the gold country.

Pennsylvania.—A delegation of land owners of Long Beach, N. J., called upon Samuel Rea, Assistant to President Roberts, this week, to enlist the support of the company in building a proposed road from Manahawkin N. J., to a point on the Philadelphia & Long Branch road to connect with Long Beach. The officials have the matter under advisement, and another conference will be held later, when the matter will be decided. The citizens claim that by the construction of about 20 miles of railroad direct communication via the Pennsylvania Railroad could be established between Philadelphia and Long Beach and Beach Haven. To reach those points at present it is necessary to use an independent line, the Tuckerton Railroad, from Whitings to Manahawkin.

Porters' Creek & Gauley River.—This company was incorporated in West Virginia last week. The incorporators are F. M. Koons, Trimble, Ohio; William A. MacCarkle, George O. Chilton and Reginald Jackson, of Charleston, W. Va. The company's plans provide for building a railroad beginning at the mouth of Porter's Creek, on Elk River, with a connection with the Charleston, Clendennin & Sutton, thence by way of Porter's Creek Valley and Twenty-mile Creek to the Gauly River, in Nicholas County. The company is supported by the same capital that is building the Charleston, Clendennin and Sutton, and this enterprise will be in connection with it. It will develop coal and timber and will pass through a wild country.

San Francisco & San Joaquin Valley.—An interesting dispatch from San Francisco states that President Claus Spreckels will soon leave that city to make a trip to Europe on business connected with the construction of the San Joaquin Valley Railroad. The business is presumed to mean the placing of an issue of bonds in England. So far about one-half of the amount which it is estimated will be necessary to construct the railroad has been subscribed by California people to the capital stock of the company. The plan was to secure the entire amount necessary to build the railroad from these local stock subscriptions and not to issue any bonds to build the railroad. It is stated now that subscriptions have been secured for the sum first announced as necessary to build the railroad. It has been decided to issue a similar amount of bonds. It may be, however, that this statement is premature, and later and fuller advices from San Francisco may give some other explanation.

Savannah, Americus & Montgomery.—The plans for the reorganization of this company seem to be going on smoothly, and it is announced that about $600,000 has been secured by the Reorganization Committee in Baltimore to complete the reorganization and to make certain improvements. It is known that that committee has deemed it necessary for the successful operation of the railroad that it secure a better entrance to Savannah. For some years past the company has had trackage rights over the Savannah, Americus & Montgomery, operated by the Central of Georgia between Lyons and Savannah. That agreement has not been satisfactory to those now in control of the property, and it is understood that they have decided that the Savannah, Americus & Montgomery ought to build an independent line from its present eastern terminus at Lyons into Savannah. This was the intention when the construction of the line was undertaken. The Central of Georgia was at that time building west of Savannah to connect with another division of its system, and finally, to avoid an unnecessary paralleling of lines by the two companies, an agreement was made by which the lines were connected at Lyons, and each company secured trackage rights over the road of the other company.

Trinity, Cameron & Western.—Tracklaying and grading on the road, out of Georgetown, Tex., has been suspended for some weeks on account of rainy weather, and it is not likely to be resumed for two weeks. Captain Emsy Taylor, President, is now in New York to negotiate the sale of bonds for the division now building.

Valley Terminal.—Articles of incorporation were filed at Madison, Wis., last week by this company to build a line from Green Bay to Neenah, a distance of about 30 miles. The incorporators are J. J. MacIntyre, of Niagara Falls, N. Y.; Joseph Taylor, of Detroit, Mich.; A. L. Allen, of Chicago; Walter Pelton, J. M. Baer, of Appleton; G. E. Green, of Binghampton.

West Virginia Short Line.—This company, chartered in West Virgina a few months ago to build a railroad from the Ohio River, at New Martinsville, Witzel County, to Clarksburg, Harrison County, has a party of engineers making the final survey. One route contemplated following Fishing Creek from the Ohio to the headwaters, and another cut through the hills of Tyler County, coming to the river at Sistersville. Both routes were surveyed and it was found that the cost of the Tyler County route over the Fishing Creek route would be about half a million dollars. The engineers are now making the final surveys for the Fishing Creek route.

Winnipeg & Great Northern.—Chief Engineer Alexander Stewart this week put on a full party of engineers locating this railroad, otherwise the Hudson Bay Railway, from end of track northward. Contractors are buying material and will at once begin grading both north and south, from Portage La Prairie. The line of the road has been changed, and part of the 40 miles built some years ago north from Winnipeg is to be abandoned as part of the main line. The road will run west, instead of east of Lake Manitoba, and will cross the Narrows between it and Lake Winnipegoosis, 125 miles northwest of Winnipeg city. Under the terms of their contract Grant, Foley Bros. & Guthrie, are to get all supplies possible in Canada.

GENERAL RAILROAD NEWS.

Baltimore & Ohio.—A good deal has been printed in the last week or two concerning the purchase by this company of two short roads in Northern Indiana and in Michigan, the Elkhart & Western and the St. Joseph Valley railroads, each about 10 miles long. The officers of the company at Baltimore deny these reports and state that no action has been taken for acquiring either of these lines and that there is no purpose to do so.

Burlington, Cedar Rapids & Northern.—The report for the year ending Dec. 31 shows the following comparisons:

	1894.	1893.
Gross earn	$3,748,828	$4,224,754
Operating exp	2,722,217	3,078,435
Net earn	$1,026,611	$1,146,319
Other income	57,197	36 949
Total	$1,083,808	$1,183,268
All charges	818,278	822,005
Balance	$245,530	$361,263
Dividend	165,000	165,000
Surplus	$80,530	$96,263

The company owns 433 miles and leases 700 miles. Gross earnings decreased $475,924, but operating expenses were reduced $356,217. The unfunded debt was reduced in the year $98,085. The company laid 1,000 tons more steel rails and 52,000 more ties than in 1893. Three large steel bridges were also erected. The unfunded debt is $202,368. Net earnings per mile were $905, against $1,010 in 1893. Passengers carried, 749,371, against 770,533 in 1893. Rate per passenger per mile, 2.707c., against 2.561c. Freight tonnage, 1,534,364, against 1,730,831. Rate per ton per mile, 1.242c., against 1.117c.

Central Pacific.—The company has made arrangements to extend for 2½ years from July 1 next its $2,955,000 first mortgage gold bonds maturing on that date. The extension is to be at the rate of 5 per cent., but the company reserves the right to redeem them at any time before the expiration of the term of extension by paying 6 per cent. interest. The extension is made to the date of maturity of the latest maturing first mortgage bonds, on or before which date the company expects to arrange a long extension of its entire first mortgage issue.

Grand Rapids & Indiana.—J. E. Davidson and H. H. Barnes, trustees for the first mortgage bonds to the amount of $3,000,000, have filed a bill in the Federal Court, at Indianapolis, asking the appointment of a receiver and the foreclosure of the bonds. It is alleged that interest to the amount of $600,000 is past due and that the railroad is insolvent. The proceeding is auxiliary to one begun in the Federal Court for the Western District of Michigan last week.

Lynchburgh & Durham.—An important change in the management and operation of this road, which extends from Lynchburgh, Va., to Durham, N. C., is probable. The road has been operated for some time by the Norfolk & Western, to which it was leased for 999 years. If the Norfolk & Western defaults on the payment of the interest on the bonds of the Lynchburgh & Durham the latter road reverts to the Pennsylvania Construction Co., which built the road and which holds its bonds. It is now given out that the Norfolk & Western will surrender its lease—one report having it that the lease has already been surrendered.

Mary Lee Coal & Iron Co.—The properties of this company were sold last week to satisfy a decree in favor of the Mercantile Trust & Deposit Co., of Baltimore, holders of two issues of bonds to the total amount of $240,000. The bondholders were the purchasers, at $40,000. The property consists of coke ovens, coal mines, ten miles of railroad, and ore lands near Birmingham.

New York, New Haven & Hartford.—The Connecticut Senate has passed a resolution providing that holders of debenture bonds of the railroad may have the right to subscribe for any additional stock issued in the same ratio and at the same price the new stock is offered to the stockholders.

New York, Ontario & Western.—The new $500,000 four per cent. bonds of the company are unders ood to have been placed in London by Messrs. Kuhn, Loeb & Co. They were issued about 18 months ago to pay in part for some new coal cars, and were deposited with the New York Guaranty & Indemnity Co , along with a pledge of the new equipment, to pay for the car trust notes issued in connection with the transaction. The company recently paid off enough to release the bonds. As the company will be able soon to retire its first mortgage bonds the refunding 4s will eventually become the underlying issue of the property.

Norfolk & Western.—The Reorganization Committee, of which Gen. Lewis Fitzgerald, of New York, is President, held a number of meetings recently and has made considerable progress in reorganization matters. A sub-committee, consisting of J. Kennedy Tod, Robert Fleming, of London, and A. A. H. Boissevain, has been appointed to prepare a plan of reorganization. It is said that the idea favored by this committee is to issue a new 5 per cent. mortgage to take up the present 6 per cent. bonds now outstanding and also to issue a consolidated 4 per cent. mortgage to replace the underlying bonds and to pay off the floating debt. The Lynchburgh & Durham and the Roanoke & Southern, which are now operated under a lease by which the Norfolk & Western guarantees the interest on the bonded indebtedness of those roads, are to be surrendered to the local stockholders. In is intended to reduce the fixed charges to about $2,300,000. The net earnings, it is estimated, will equal at least $2,900,000, which will leave a considerable sum for improvement, besides a something toward a dividend. The condition of the property is reported to be very good and no unusual requirements for betterments will be needed. The contracts with the individual coal operators, which were very unprofitable to the company, have been abrogated and the company is now in a position to get a good revenue from this traffic. The reports of earnings for the last four months show an improvement of about $127,000 over the figures of the corresponding months last year.

Ohio Southern.—George W. Saul, President and General Manager of this company, was appointed receiver by the State Court at Lima, O., last week. The petition stated that the road was insolvent; that it owed over $80,000 on pay rolls; over $5,000 to the Lima Machine Works for repair work; that the county taxes remained unpaid and that the company is unable to meet any of these claims against it. In the statement issued by one of the officers, that company, it is stated, had on April 30 last a floating indebtedness existing amounting to over $435,000, exclusive of car trust obligations and accrued interest. This was due for loans advanced to carry on operations and the company had about $347,000 assets, at the present market values, to meet these claims. Two applications for receivers were made and the company was compelled to assent to one of these applications by which it could secure the appointment of its President as receiver. For some time efforts have been made to sell certain securities which would give a controlling interest to the company in New York City, and the officers state that they expect to complete this transaction shortly and to have the receiver discharged. The Ohio Southern operates about 224 miles of railroad, its main line extending from Lima to Wellstown, O. The coal branches make up over 40 miles of the mileage. It has an outstanding capital stock of $3,840,000 and the outstanding funded debt amounts to $5,463,000.

Pensacola & Perdido.—In the United States Court at Pensacola, Fla., on May 11, upon the application of a stockholder, J. S. Leonard, Cashier of the First National Bank of Pensacola, was appointed Receiver of the road, and a decree entered setting aside the lease of the road to the Pensacola, Alabama & Tennessee Railroad, and annulling the contract between the road and the Southern Improvement Co., and ordering that Henry McLaughlin and C. H. Dishman, President and Secretary, repay all salaries drawn by them exceeding $2,400 per annum. They had each drawn $5,000 per annum. The Pensacola & Perdido road is eight miles in length and has been operated for many years between Pensacola and the large lumber mills at Millview. The Pensacola, Alabama & Tennessee road is a continuation of the Pensacola & Peridido road, its present terminus being at Muscogee, 20 miles north of Pensacola. The property came into the possession of McLaughlin and Dishman nearly three years ago.

Savannah, Americus & Montgomery.—The sale of the railroad is fixed for May 17 at Savannah, and arrangements already made provide for its purchase by the reorganization committee. A minimum price of $1,800,000 has been placed on the property by the courts. A loan of $600,000 has been negotiated by the reorganization committee with the Baltimore Trust and Guarantee Company. The funds obtained by the loan will be applied to the retiring of prior liens, including the bonds of the Americus, Preston & Lumpkin and the receivers' certificates. The road extends from Lyons, Ga., to Montgomery, Ala., 265 miles, and operates under a lease the Albany, Florida & Northern Railroad from Cordele to Albany, Ga., making a total mileage of 300 miles. It is said that the building of an extension of the road from Lyons to Savannah may follow the reorganization of the company.

South Haven & Eastern.—The General Manager of the company writes to us asking us to deny a recent newspaper report that this property has been purchased by the Chicago & West Michigan Railroad. He states that no such transfer has been made and that any reports of the sale of the property are unfounded. The company is now operating 37 miles of road from Lawton, near the southern state line of Michigan, northwesterly to South Haven, on Lake Michigan, where it has valuable dock property. The road has connection with the Michigan Central at both terminals, and crosses the Chicago & West Michigan at Hartford, about midway on the road, the line traversing what is known as the Michigan Fruit Belt The condition of the road has been much improved recently and considerable new equipment has been put in service. A line of boats making two daily trips between the terminals at South Haven and Chicago is maintained.

Toledo, Ann Arbor & North Michigan.—The recent sale of the railroad to R. C. Martin, of New York, for $200,000 has been set aside by Judge Taft, sitting with Judge Severans of United States Court of Appeals, and Judge Ricks of the United States District Court in Cincinnati. Some time ago a sale of the road was made to R. C. Martin in trust for the bondholders. He made a bid of $200,000, thinking the price sufficient, as he was buying it for bondholders who owned $7,000,000 in bonds. The railroad company moved to set the sale aside on the ground that the price was inadequate and also that there was no appraisement. Another sale will have to be made.

TRAFFIC.

Traffic Notes.

The Erie road now brings milk to New York from Big Flats, Chemung County, N. Y., 283 miles.

The Royal Blue line between New York and Washington has put on one or two additional through express trains.

The Sunday trips of the boats of the Fall River Line were resumed for the summer on May 5, with the "Priscilla" and "Puritan" in commission.

The Southern Railway has announced a heavy reduction in freight rates on grain and provisions to the south and east, from Memphis and all points west thereof.

Through vestibule trains are now running between Washington, D. C., and Chattanooga, Tenn., over the Southern Railway via Greensboro, Salisbury and Asheville, N. C.

Local papers report that the railroads in Southern Michigan are now carrying to local millers grain which was shipped out from the same places a few months ago. It appears that the farmers and country buyers did not hold back enough grain to keep the local mills running.

The Southern Pacific has made a reduction of 40 per cent. on local fruit shipments in California. The through rates to the East apply only from San Francisco, San Jose and Los Angeles and shippers at other places have to pay local rates to one of these starting points; the reduction applies to these side rates.

The "London Limited" express train, which the Pennsylvania ran from Philadelphia to Jersey City last summer to connect with steamers sailing for Europe, will be run again this summer. The train starts from Philadelphia at 8 a. m., and a connecting boat takes passengers directly to the pier of the American Line.

The St. Louis, Chicago & St. Paul, a comparatively new railroad in southwestern Illinois, announces that it will absorb the arbitrary charge over the St. Louis bridge on freight to and from that city. This is hailed as an important event by the St. Louis merchants, to whom the bridge arbitrary has been a nightmare for a long time.

The report of the tonnage passing over the Chesapeake & Ohio Canal for the month of April shows that between 8,000 and 9,000 tons of coal were shipped from Cumberland to Williamsport. This is a little better than the average shipment of coal during this month for the last few years, except in April of 1894, when a very large amount of Cumberland coal was carried, on account of the strike of the miners in the Pennsylvania fields.

The management of the Ohio River Railroad, running between Wheeling, W. Va., and Kenova, W. Va., and connecting the Pennsylvania Lines with the Chesapeake & Ohio Railroad, has decided to put buffet parlor cars on all through trains; all trains run through by daylight. There has lately been a considerable increase in through travel and the Ohio River finds that it would be to its advantage to give the same accommodations as are given by the Pennsylvania and the Chesapeake & Ohio.

A suit was begun in the United States District Court at Philadelphia, May 9, by the United States District Attorney against the Baltimore & Ohio Railroad to recover a penalty of $500 for the alleged violation of the law relating to the transportation of cattle. The law requires cattle being transported from one state to another to be fed, watered and rested for five hours out of every 28 hours. It is charged that the defendant recently brought a carload of horses from Chicago, Ill., to Chambersburg, Pa., boxed up in cars for 70 consecutive hours.

The Texas Railroad Commissioners who recently announced that they intended to abolish many of the commodity rates now in force on the railroads of that state, held a consultation with shippers and others on May 11, and discussed the subject at length, but concluded to defer action until after the meeting of the railroads which was to be held at St. Louis this week. Commissioner Reagan said, according to a newspaper report, that if the St. Louis meeting does not put Texas jobbers on an equality with Chicago and St. Louis on common point-interstate shipments, the Commissioners themselves would do it even though it did precipitate a freight war in Texas.

The law recently passed in the state of Washington requiring the Government to appoint shingle weighers on each railroad running out of the state, is causing considerable discussion, and the principal railroads are trying to show that it is not valid. It requires the railroads to pay the weigher 50 cents for each car weighed. A Seattle newspaper which made inquiries found that everyone objected to the law as useless, but later a communication was published from a shingle manufacturer saying in substance that the "shippers" or local buyers were in the habit of misstating the weights to manufacturers and thereby cheating them, and saying that the law was necessary to protect the mill men.

Strawberries.

The Wilmington (N. C.) *Messenger* reports that on May 11 the strawberries shipped to Northern cities by the Atlantic Coast Line, from places between Wilmington and Goldsboro filled 18 refrigerator cars, the first solid trainload ever sent from the South. The 18 cars contained 5,500 crates, or 176,000 quarts, and two cars in another train made up a total of 208,000 quarts, valued at $31,200. For the week ending the 11th the total shipments were 30,000 crates. The Wilmington Ice Factory furnished 50 tons of ice for the 18-car train. The refrigerator cars are furnished by the California Fruit Transportation Co. Three years ago this region shipped 43 cars of berries, the next year 68 and last year 89. The shipments this year are expected to be more than double those of 1894.

Chicago Traffic Matters.

CHICAGO, May 15, 1895.

Central Traffic lines from Chicago are reported to be absolutely maintaining the rates agreed upon May 1. The officials of the association claim that no deviation whatever is being made. There is some trouble at the Peoria gateway on through business from western roads, but the Chicago managers are hopeful that they will be able to correct this before it affects eastbound rates from this city. That the easbound freight agreement is working fairly well is shown by the withdrawal of the Michigan Central from eastbound business from Chicago for the present. This means that the Michigan Central is largely ahead of the agreed percentage under the agreement, and is complying with the agreement, as a means of evening up.

The Chicago Car Service Association since the transfer of its management from the General Managers' Association to the General Superintendents' Association has been running smoothly, notwithstanding the fact that the Chicago, Milwaukee & St. Paul still declines to again become a member. On account of the withdrawal of the St. Paul, four other roads, the Northwestern, the Burlington, the Chicago Great Western, and the Wisconsin Central reserve the right to meet the competition of the St. Paul, and are consequently practically out of the Chicago Association, although they continue to contribute to its maintenance, and to act in accord with the other members in respect to all business except that directly in competition with the St. Paul. It is probable that when business picks up an amicable adjustment will be arrived at between the St. Paul and the Northwestern in regard to the Wisconsin situation, which really caused all the trouble. As soon as this is brought about, the St. Paul will again join the Chicago Association, and the other roads will cancel their conditional notices.

The general passenger agents of the lines west of the Missouri River held a conference last week, and agreed to withdraw the reduced one-way rates from Colorado common points to Missouri River points May 19, and also to endeavor to clear the market of the harvest excursion tickets, which have caused all the rumpus. The Union Pacific representative disclaim responsibility for placing the excursion tickets in the hands of scalpers, alleging that an Omaha scalper purchased the tickets at Council Bluffs, and placed them on the Denver market, intending by so doing to demoralize regular rates.

Western lines are apprehensive that the fight of the St. Louis lines to southeastern territory, brought about by the reduction of 5 cents per 100 lbs. on provisions from St. Louis by the Louisville & Nashville, supplemented by a reduction of 4 cents by the Missouri Pacific from Missouri River points to the Ohio River, will bring about a reduction in packinghouse product rates from all Missouri River points, unless an agreement is speedily reached. The aggregate reduction (9 cents) has now been applied from Missouri River points as far north as South Omaha, and also from Sioux City, Sioux Falls and Cedar Rapids by the Illinois Central. The Chicago and Ohio River Association has issued a tariff adding its proportional rate (12 cents) to the reduced basis south of the Ohio River, thus reducing the through rates 5 cents from Chicago to southeastern territory. Chairman Midgely is endeavoring to bring about a joint meeting with the Commissioners of the southeastern associations, at which he is hopeful a restoration of rates may be brought about.

The new schedule of maximum freight rates prepared by the Illinois Railroad and Warehouse Commission as a result of the conference held with the railroads and the freight bureaus, is now in the hands of the printer. Proof sheets have not yet been received here, but it is stated that the reduction on commodities to Illinois points will average about 20 per cent.

Freight matters in southwestern territory are still unsettled. The refusal of the Missouri Pacific to accept the revised percentages of the Trunk Line Committee, leaves matters where they were before the last attempt to fix the agreement was made. Both the Burlington and the Missouri Pacific are dissatisfied with their proportions and the other roads do not really know what percentages they are working under.

The Western passenger representatives are again at work trying to prepare another form of trans-continental agreement, in the hope that it will prove more acceptable than that now under discussion. May 23 is now set as the date when it is to be ready and submitted by the committee. In the meantime Chairman Caldwell is in New York trying to finally round up the Canadian Pacific-Grand Trunk disagreement over commissions on west-bound immigrant business. With the adjustment of the trouble over the home-seekers' excursion tickets, the Western passenger situation is now in fair shape. A report was current here last week that the Burlington was cutting the excursion rates on summer tourist tickets, by raising the commission from $2 to $5. The only basis for the report was the action of that line in putting in a round trip excursion via Billings to the Yellowstone Park territory, including various side rides, hotel and carriage bills, etc., on which they proposed paying their agents $5 commission. As the rate made aggregated $130, against $45 for the regular excursion without the "trimmings," the most of the other roads see no impropriety in the arrangement for increased commissions.

Commissioners Goddard and Midgley met with the Chicago St. Paul lines last week to consider a basis of division on through business by lake and rail, but no agreement was reached.

The shipments of eastbound freight, not including live stock, from Chicago, by all the lines for the week ending May 11, amounted to 43,931 tons, against 53,285 tons during the preceding week, a decrease of 9,354 tons, and against 54,875 tons for the corresponding week last year. The proportions carried by each road were:

Roads.	WEEK TO MAY 11.		WEEK TO MAY 4.	
	Tons.	p. c.	Tons.	p. c.
Michigan Central	4,348	9.9	3,062	5.7
Wabash	2,724	6.2	4,577	8.6
Lake Shore & Mich. South.	6,732	15.4	7,989	15.0
Pitts., Ft. Wayne & Chicago	5,607	12.7	10,625	19.9
Pitts., Cin., Chi. & St. Louis.	5 761	13.1	7,517	14.1
Baltimore & Ohio	2,653	6.0	1,997	3.7
Chicago & Grand Trunk	3,597	8.2	1,964	3.7
New York, Chic. & St. Louis	3,788	8.6	5,660	10.7
Chicago & Erie	6,949	15.8	8,126	15.3
C., C., C. & St. Louis	1,772	4.1	1,768	3.3
Totals	43,931	100.0	53,285	100.0

Of the above shipments 2,166 tons were flour, 18,019 tons grain and mill stuff, 6,053 tons cured meats, 7,245 tons dressed beef, 1,376 tons butter, 1,155 tons hides, and 6,607 tons lumber. The three Vanderbilt lines carried 33.9 per cent., the two Pennsylvania lines 25.8 per cent.